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Vol. 21, No. 12 DECEMBER 1959

FISH and WILDLIFE SERVICE
United States Department of the Interior
Washington, D.C.

UNITED STATES
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COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries prepared in the BUREAU OF COMMERCIAL FISHERIES.

Joseph Pileggi, Editor
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Mailed free to members of the fishery and allied industries. Address correspondence and requests to the: Chief, Branch of Market News, Bureau of Commercial Fisheries, U. S. Department of the Interior, Washington 25, D. C.

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The printing of this publication has been approved by the Director of the Bureau of the Budget, May 21, 1957. 5/31/60

CONTENTS

COVER: Splitting a 6,000-pound catch of Pacific ocean perch aboard a West Coast trawler, which is using the drum-trawling method--the net is towed from davits located one on each quarter of the stern. The principal unit of the drum-trawling system is the drum upon which the trawl is wound. Drum trawling, a relatively recent development, was introduced into the Pacific Northwest otter-trawl fishery in 1954. (See p. 34 of this issue.)

	Page
Second World Fishing Boat Congress:	1
Part I - Observations of a United States Government Fishery Methods and Equipment Specialist, by Stewart Springer	2
Part II - Observations of a United States Government Fishery Technologist, by Joseph W. Slavin	5
Part III - Fish Quality Stressed, by Joseph W. Slavin	10
An Economic and Financial Study of the Fluke Otter-Trawl Fishery of New Jersey, by Frans L. Widerstrom, Jr.	17
A Report to the Shellfish Industry, by Arnie J. Suomela	27

	Page
RESEARCH IN SERVICE LABORATORIES:	31
Sodium Content of Fish	31
Standard for Frozen Salmon Steaks	31
Value of Fish-Body Oil in Reducing Cholesterol Levels	32
TRENDS AND DEVELOPMENTS:	34
Fishing Vessel and Gear Developments:	
Equipment Note No. 2--Pacific Coast Drum Trawling, by Fred Wathne	34
Agriculture Yearbook Includes Story of Fish	36
American Fishery Advisory Committee:	
Programs and Problems Discussed at 10th Meeting	37
American Samoa:	
American Samoa Tuna Landings, January-September 1959	38
Atlantic Estuarine Research Society Meets	38
California:	
Pelagic Fish Population Survey off Coast of Southern and Central California Continued (M/V Alaska Cruise 59A6 and Airplane Spotting Flight 59-14)	39
Investigation of Abalone Resources Continued (M/V Nautilus Cruise 59N3, and Mollusk Cruises 59M1 and 59M2)	40
Shrimp Study off Central and Northern California Coast Continued (M/V N. B. Scofield Cruise 59S5)	42
Canned Fish:	
Consumer Purchases, August 1959	43
Canned Foods:	
Survey of Movement of Canned Foods by Method of Transportation	44
Central Pacific Fishery Investigations:	
Oceanographic and Fishery Survey in Hawaiian Waters Completed (M/V Charles H. Gilbert Cruise 46)	44
Skipjack Tuna Landings in Hawaii Increase According to Prediction	45
Crabs:	
Future Blue Crab Research Programs Discussed at Virginia Meeting	46
Fisheries Loan Fund:	
Loans Approved Through September 30, 1959	47
Federal Purchases of Fishery Products:	
Department of Defense Purchases, January-September 1959	47
Fish Meal:	
Quicklime Processing Method Developed	48

	Page
TRENDS AND DEVELOPMENTS (Contd.):	
Frozen Fish:	
Refrigerated Truck Hauling Costs May Increase	48
Fur Seals:	
Alaska Fur-Seal Skin Harvest in 1959 Lower	48
Prices for Alaska Fur-Seal Skins at Fall Auction	49
Great Lakes Fisheries Exploration and Gear Research:	
Exploratory Smelt Fishing in Lake Erie Continued (M/V Active Cruise 5)	49
Great Lakes Fishery Investigations:	
Western Lake Erie Biological Research Continued (M/V George L. Cruise 7)	50
Western Lake Superior Fishery Survey Continued (M/V Siscowet Cruises 6 and 7)	51
Survey of Eastern Lake Superior Continued (M/V Cisco Cruise 5)	52
Gulf Exploratory Fishery Program:	
Exploratory Trawling for Shrimp off Puerto Rico and Virgin Islands (M/V Oregon Cruise 62)	53
Inspection of Fishery Products:	
Crab Meat First Fresh Fishery Product Under Continuous Inspection	54
Lot Inspection Services Expanded	54
Marketing:	
Edible Fishery Products Marketing Prospects, Winter-Spring 1959/60	55
North Atlantic Fisheries Exploration and Gear Research:	
Gulf of Maine Shrimp Stocks Surveyed (M/V Delaware Cruise 59-11)	55
Ocean Currents:	
Coast and Geodetic Survey Initiates Studies off New England Coast	56
Oysters:	
Long Island Sound Spawning and Setting of Oysters and Starfish	56
South Atlantic Exploratory Fishery Program:	
Exploratory Surveys for New Fishery Resources Initiated	57
Continental Shelf off North Carolina Coast Surveyed (M/V Silver Bay Cruise 18)	57
South Carolina:	
Fisheries Biological Research Progress, July-September 1959	59
Sponges:	
Natural Sponge Industry to be Featured in Film	60

Contents Continued Page 123.

COMMERCIAL FISHERIES REVIEW

December 1959 Washington 25, D.C. Vol. 21, No. 12

SECOND WORLD FISHING BOAT CONGRESS

CONTENTS

	Page		Page
Introduction	1	Part II - Observations of a United States Government Fishery Technologist	5
Part I - Observations of a United States Government Fishery Methods and Equipment Specialist	2	Part III - Fishery Quality Stressed	10
		Appendix - List of Papers Presented	14

INTRODUCTION

The second World Fishing Boat Congress, arranged by the Food and Agriculture Organization of the United Nations, convened at FAO's Headquarters in Rome April 5-10, 1959. Fifty technical papers were presented and a total of 293 participants from 35 countries registered. The representation was: Austria 1; Belgium 4; Canada 6; Costa Rica 1; Cuba 1; Denmark 6; Dominican Republic 1; Finland 4; France 31; Germany 16; Ghana 1; Greece 1; Iceland 1; India 1; Ireland 4; Israel 3; Italy 70; Japan 10; Korea 2; Libya 1; Mexico 1; Morocco 5; Netherlands 17; Norway 10; Pakistan 1; Philippines 1; Poland 5; Portugal 2; Spain 3; Sweden 10; Switzerland 5; Tunisia 1; United Kingdom 42; United States 19; U.S.S.R. 4. In addition, representatives of the General Fisheries Council for the Mediterranean and the International Labor Office attended.

Fig. 1 - The opening session of the Second World Fishing Boat Congress held at FAO headquarters in Rome.

The theme of the Congress, PERFORMANCE, was divided into four main subjects: Tactics, Construction, Sea Behavior, and Productivity. These were discussed at separate sessions for which an annotated program outlined the background of the subjects and those to receive special attention at each session.

The discussion on tactical methods was split into sessions on fishing methods and deck arrangement, and command of operations. These sessions started with brief introductions of their papers by five authors on drift-netting, gill-net fishing, long-line fishing, pole-and-line fishing, and trawling.

The subject of construction was divided into sections on scantlings, new materials, fish holds, installation of machinery, and costs of construction.

The session on fish holds aroused much interest, and opinions were expressed that naval architects so far had not cooperated enough with fishery technologists in developing simple and economical installations. Various freezing methods such as brine, air blast, contact and tunnel freezers came up for deliberation.

At the session on installation of machinery, not individual engine designs as such but the installation of machinery in general was discussed. Special attention was given to a paper on vibration, and there was much debate on the relative merits of controllable pitch propellers and multiple reduction gears. A United States paper, in the section on costs of construction, gave an analysis of dimensions, weights, and costs of United States-built fishing vessels, but it was emphasized that construction costs are lower in Europe.

Sea behavior was divided into sessions on resistance and propulsion, seakindliness, stability, and safety at sea. The discussion revealed the importance of determining the true operating speed of fishing vessels in order to select their most efficient proportions and shape. Participants also dealt with the advantages and disadvantages of bulbous bows and transom sterns. Suggestions were again made that FAO should continue its work on minimum stability, and the Dutch delegate explained that his Government had great confidence in the Rahola criteria.

On productivity there was a symposium on boat types and a session on the choice of size and type and the fishing boat of 1975. At the symposium, many new types of boats were described, and in the choice of size and type session, the disadvantages and advantages of factoryship operation were thoroughly examined. A Japanese representative reviewed Japanese work on developing two large fishing vessels for atomic propulsion at the session on the fishing boat of 1975.

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Part I - Observations of a United States Government Fishery Methods and Equipment Specialist

Stewart Springer*

ACCOMPLISHMENTS OF THE FISHING BOAT CONGRESS: It is obviously important to bring about better understanding of the problems of fishing vessel operators by architects, and equally important to get operators to take optimum advantage of the services naval architects can give. In practice, the naval architect must work within very narrow limits in the design of fishing vessels. Investors in new vessels are notably reluctant to authorize changes of design or to risk the very severe economic penalties for failure of a new design to give over-all performance as good as obtained from tried and proved designs. There is, consequently, little opportunity to get operational tests of designs incorporating radical departures from conventional practice. Most new fishing vessels have some new but minor changes in the hull or equipment, and undoubtedly most of these are actually beneficial and produce better performance. But this permits only a slow evolution in design under a rigorous economic selection. Without occasional radical mutation this leads to dead ends. New materials, more compact and reliable power sources, and increasingly comprehensive information on performance characteristics of certain hull designs have given the naval architect wide opportunity to make changes.

At the same time, the investor in a new fishing vessel has to consider the ever-changing requirements of the market for fishery products, as well as the general competitive situation. It seems probable that there is not only the opportunity but also the need for occasional major change. The kind of change which may result from agreement of owner and architect is illustrated by the development of the stern-chute trawler. The meeting at Rome brought together for discussion the problems of operation and the problems of construction. We may properly, I think, be hopeful that the results will be good and far-reaching.

The theme of the congress was performance, with papers grouped under the headings: tactics; construction, sea behavior, and productivity. Papers relating to

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construction and sea behavior were given somewhat more time than the others, perhaps because it is in these areas that naval architects make their principal contributions.

Experts appeared to be in agreement that there were many papers of technical excellence presented at the meeting and that the Congress was a valuable source of new ideas.

TECHNICAL PROCEEDINGS OF THE CONGRESS: Because papers and comments on them will be published later, no attempt will be made here to highlight specific points made in presentations. Such observations as can be made on overall accomplishments of the congress are necessarily personal conclusions of the writer.

Although the opening speech at the congress exhorted participants to use the imaginative approach, the discussions followed the course inevitable in scientific and technical meetings where new ideas, if any, are always roughly treated. Costs of construction, maintenance, and operation were factors entering discussions of most of the papers and the tenor of the meeting was toward the practical and conservative point of view.

There were many references to the relative merits of stern trawling and side trawling without much agreement on the part of speakers as to the efficiency or desirability of the stern trawler. Proponents of the type continue, however, to plan and build additions to the growing fleet of long-range stern trawlers. The questions concerning their merits may, thus, eventually be determined by large-scale competition.

Problems of the quality of fish arising from the need for long trips were discussed. As usual in such an exchange of views, where personal taste preferences are concerned, there was some reluctance to accept modern trends. In spite of this, some speakers pointed out that use of frozen-food products is increasing and that a wider application of freezing-at-sea methods is inevitable. Such a view seemed to be generally acceptable, provided wide use of freezing techniques could be brought about slowly. Most discussions of the question indicated that the costs for new equipment and the risks of incorrect diagnosis of the marketing trends make major moves in this direction financially hazardous for the owner-operator of fishing vessels.

Papers on specific design problems, on model testing, and on engineering problems relating to propulsion appeared to be more fruitful, although difficult for the observer not trained in naval architecture to understand, or, at the present time, to assess. Operators and builders should find some of these contributions useful in reducing construction costs and producing more efficient vessels.

The meeting was dominated, verbally at least, by persons interested in the larger and more complex vessels, and more particularly in the distant-water trawlers of the North Atlantic. Nevertheless, a number of the papers were aimed at problems of small vessels and should be especially interesting to the builders and operators of those vessels.

Two written discussions of an imaginative nature were introduced. One was an examination by Professor Takagi of Japan of the feasibility of atomic-powered factory trawlers. The other, by Lee Alverson and Peter Schmidt of Seattle, presented a preliminary design with an offset deckhouse for small stern trawlers, in an attempt to provide more deck space.

TRENDS IN WORLD FISHERIES REFLECTED BY THE CONGRESS: A growing need for making fishing more attractive as an inducement to capable young men to become fishermen was recognized in several of the presentations. The importance

of making vessels more habitable, more seakindly, and safer was stressed. Fortunately these aims are reasonably compatible with the need to make large fishing vessels more efficient. Improvements in small inshore vessels are probably equally important, but were not discussed as thoroughly. Since fishing vessels are becoming more complex, and even the smaller vessels are becoming loaded with equipment, the training of young men as fishermen was recognized as an important activity of the future.

The trend toward expansion of production by fishing in distant waters, and the use of more modern equipment, was brought out in discussions of stern trawlers, freezing-at-sea, and factoryship operations. While not spelled out specifically, it probably would have appeared to an observer with no previous knowledge of the fisheries, that technological improvements are resented by the fishing industry. This, of course, has some basis in fact. The world fishing industry is not ready to adopt or adapt all of the tools that modern technology can supply. The cost of change or innovation in the fishing fleets is not the only deterrent. An assortment of more or less related questions were present, by implication, in the discussions on the floor and in informal conversations outside the meeting.

Members of the fishing industry and fishery biologists have found some comfort in the thought, whether they subscribe to it or not, that economic forces will prevent the drastic overfishing of stocks of oceanic demersal and pelagic fishes because such overfishing is not profitable. The new element in the world fishing picture which seems to be causing concern is the intensified international competition by fleets which are subsidized in one way or another and are thus relieved of some economic limitations. It may be argued particularly that factoryship fleets concentrate very heavy fishing pressure on a limited area, moving to another only after the first has been swept relatively clean. Whether this constitutes a real threat to the world's stocks of the more desirable kinds of fishes has not received a great amount of attention from fisheries scientists. Solutions to conservation problems, particularly those which would give fishing interests a reasonably clear determination of the maximum sustainable yield by species and area, would remove some of the fears fishing vessel operators hold about the future.

Several speakers warned builders of vessels that consumers would not continue to tolerate or accept fish kept overlong on ice. Attention was called to the increasing quantities of packaged frozen foods coming into competition with fishery products. Also noted, was evidence of a change in preference on the part of consumers toward the properly frozen product. The fishing industry is in the early stages of a transition to the modern system under which the product is necessarily subject to standardized controls for quality at several points from catching to retail distribution. This is in contrast with the old system where one individual could at least follow and exert some influence on the handling methods from the time of capture to the delivery to the consumer.

The dilemma facing operators of fishing vessels making long trips involves the choice between making the change to freezing-at-sea methods now or waiting for more favorable conditions. One solution proposed on the basis of recent German experience provides for freezing equipment to handle the first portion of the catch, with icing facilities to handle that portion of the catch taken at the end of the trip.

Throughout the meetings it was apparent from discussions that distant-water fishing and near-water fishing present entirely different kinds of problems. Separation of these would have made the discussions more easily understood. A line of separation could not be precise, but a definition of distant-water fishing as that requiring more than five days absence from port might serve.

It goes without saying that the fishing vessel operator wants low-cost operation and a product that can be marketed favorably. The discussions of the congress indi-

cated that the operator recognizes the need for more comfort and safety for the crews, facilities for landing a product of sufficiently high and uniform quality to meet the new market demands, and vessels of greater efficiency in particular fisheries. At the same time the fishing industry is not able to support large-scale experimentation in design of vessels.

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Part II - Observations of a United States Government Fishery Technologist

By Joseph W. Slavin*

INSTALLATION OF MACHINERY: This part II is concerned only with the discussions of vessel design and operation that may be of interest to fishery technologists. Some notes are also included on personal discussions with fishery technologists, engineers, and naval architects. At this session papers were presented on the various aspects of the design and operation of steam, Diesel, and Diesel-electric engines. Some information was also given on the use of variable-pitch propellers.

Hopwood and Mewse in their paper on a comparison of steam- and Diesel-driven trawlers point out that the use of Diesel results in more space for storage of the fish, less fuel consumption, less maintenance, and more efficient fishing. It was most interesting to learn that many of the fishing vessels used in foreign countries are still driven by steam rather than Diesel engines; this is particularly true in the United Kingdom and Germany.

Some discussion was given to the efficiency of Diesel-electric propulsion as compared to Diesel. Gueroult of France remarked that Diesel-electric propulsion offers the advantages of ease of maneuverability and the use of compact high-speed engines. His observation was that the fuel consumption with Diesel-electric is higher than for a Diesel engine. Hunter of England stated that with Diesel-electric propulsion more efficient use could be made of the generators; thus the over-all fuel consumption is slightly less than that for Diesel engines. There was however no question about the superiority of Diesel-electric propulsion for factoryships where a lot of auxiliary machinery is required. This type of propulsion equipment should be given serious consideration in designing a freezing-fish-at-sea vessel. Heinsohn of Germany mentioned briefly that the free-piston engine being used on one of the German stern trawlers is lower in efficiency than Diesel engines. However, some bugs still have to be taken out of this machinery. The free-piston engine is a relatively new development and should be watched closely.

It was also mentioned that the use of variable-pitch propellers on fishing vessels is increasing. On the medium and small trawlers a variable-pitch propeller offers the advantage of increased speed, whereas on a larger vessel its use will result in increased efficiency during trawling. In this connection Dwight Simpson mentioned that he is designing two new fishing trawlers, about 100 feet long, for Boston fishing interests. Both of the vessels will be equipped with variable-pitch propellers.

STERN TRAWLING: Heinsohn in his paper on "Design Studies for Stern Trawlers" stated that there are no appreciable differences between the cost of constructing stern trawlers and conventional trawlers, provided the vessels are over 180 feet long. For smaller vessels stern trawlers are more costly. He recommended that on small stern-trawling vessels the engineroom be located forward to provide a large enough chute for hauling up the net. This means that the propeller shaft must run through the fish hold, generally an undesirable arrangement. Heinsohn later in a private discussion expressed the opinion that stern trawling can be satisfactorily applied to a 150-foot vessel. About the only disadvantage of this method of fishing is the difficulty in getting the net free if it hangs up on some obstruction while fishing. This however is not a major problem and can be dealt with through experience.

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The comments received on stern trawling were both favorable and unfavorable to this method of fishing, with the former being in the majority. Captain Glanville of Ireland stated that stern trawling will permit more productivity, greater safety at sea, and ease of handling; it is a must for the future. In complete agreement was Soublin of France who made a trip on a Russian stern-trawler factoryship. He mentioned that the technique of stern trawling on Soviet trawlers is well perfected from every point of view; it results in increased production, good-quality fish, and enables the crew to work under better conditions. Soublin, however, questioned the principle of this method of fishing since it may eventually contribute to depletion of many fishery resources. This latter point was also stressed during the Congress by other contributors. In other comments on this subject, Takahashi of Japan mentioned that they had constructed a 7,500-gross-ton stern-trawler and freezer vessel. However, some difficulty in operation was encountered because of the short length of the chute. It was interesting to learn that the size of the winches (60 to 90 hp.) used for stern trawling were the same as those used for conventional trawlers. A similar opinion regarding winch size was expressed by Cardoso of Portugal. He mentioned that his Government is building an experimental stern trawler to encourage industry to adopt this practice.

In opposition to stern trawling, Fred Parkes commented that he did not think the Germans were too pleased with this method of fishing. He seemed to be of the opinion that this method still has to be proven in many respects, especially for the smaller vessels. Hunter of England was also somewhat doubtful about the merits of stern trawling. He thought the chute to be a safety hazard and was concerned about the loss of space in crew's quarters due to the use of the chute.

In conclusion, the advantages of stern trawling apparently outnumber the disadvantages. Serious consideration should, however, be given to the use of a door to block off the chute and prevent fishermen from getting washed overboard when handling the trawl wire.

In this connection an English firm has designed a 100-foot stern trawler that does not require a chute for hauling up the net. I visited the office of this firm during my trip through England and saw movies of the operation of a model of this device. Briefly, the gear employed consists of a hydraulically-operated boom located at the stern of the vessel. This boom is moved vertically through a 90-degree arc as may be necessary to let out and take in both the net and the trawl doors.

PRODUCTIVITY: In the paper on "Modern Refrigerated Factory Ships in Japan," it was pointed out that ten factoryships have been built in Japan since 1953. They are used principally for salmon fishing and whale catching. The vessels are equipped with modern conveyors, refrigeration machinery, quick-freezing equipment, cooling equipment for refrigeration of the cargo holds, and canning equipment. Each catcher fleet usually employs two refrigerated factoryships and one unrefrigerated factoryship. In the Northern Pacific Ocean, for salmon fishing, about 30 catcher boats (50 to 80 gross tons each) are assigned to one refrigerated factoryship. Ammonia-compression refrigeration systems are used on all Japanese factoryships to provide refrigeration. Cold calcium-chloride brine flowing through steel-pipe coil grids is used to refrigerate the hold to a temperature of 0° to -4° F. Freezing is usually accomplished in a special shelf-freezer in which brine is circulated. In this process the fish are pressed between the metal shelves and the shelves lowered into the cold brine. After 5 to 6 hours the shelves are raised and the slabs of fish are removed to cold storage.

In introducing the paper on "Choice of Boat Type and Size for Polish Deep-Sea Fisheries," Orszulak mentioned that four types of fishing vessels should be considered for the Polish fisheries. Three of these would be stern trawlers consisting of (1) a processing-freezing vessel of about 1,000 tons, (2) a freezer vessel of 1,000 tons, and (3) a smaller vessel of 550 tons for salted herring. The fourth vessel would be a side-fishing trawler of about 550 tons for catching herring for salting. The factors that should be considered in selecting a fishing vessel are (1) size of

catches, (2) method of preservation, (3) distance to and from the fishing grounds, and (4) time that the vessel is required to stay at sea. In concluding, the speaker mentioned that a new processing-freezer stern trawler (similar to the Russian stern trawlers) is now under construction in Poland. This is the first vessel of this type to be built in Poland. I understand that in all about 45 of these vessels will be built in Poland in the near future. Later, in response to a question on Polish factory vessels, Orszulak stated that one of these new freezer trawlers will handle 50 tons of raw fish a day. Each vessel will have 3 filleting lines, one for white fish longer than 70 centimeters (28 inches), one for ocean perch, and one for filleting white fish smaller than 70 centimeters (28 inches). The vessel will also be equipped with a liver-oil plant, fish-oil plant, and a fish-meal plant having a capacity of 25 tons per day. The Polish factory trawlers will use ammonia-compression refrigeration systems and calcium-chloride brine systems for cooling the fish holds. Of particular interest is the observation that one Polish or Russian factoryship of this size could, during a year (280 fishing days), catch over 28 million pounds of fish.

Eddie, in a resume of his paper on "Propulsion and Processing Machinery for Deep-Sea Trawlers," stated that the Torry Research Station has become interested in this subject in connection with the economic aspects of freezing fish at sea. He pointed out that many trawlers are now operating at high speeds so they can spend as much time on the fishing grounds as possible and spend a minimum amount of time "steaming." However, if freezing at sea is employed instead of icing, the vessel can stay on the fishing grounds as long as possible. Therefore, it is not necessary that freezer trawlers operate at high speeds. Thus a savings can be made in the costs of operating the propulsion machinery of freezer trawlers over that of the cost of operating the propulsion machinery of conventional trawlers. In this connection, Eddie pointed out that a 15-knot British icing trawler spends an average of 160 days a year on the fishing grounds, whereas a 13.5-knot part freezer-icing trawler would spend about 180 days a year on the fishing grounds. Thus an increase in fishing time would also result, in addition to decreased fuel costs for propulsion equipment. This is a very important point and represents a fresh approach to the problem of reducing the over-all vessel operating costs associated with freezing fish at sea. Eddie, however, in his analyses did not determine the increase in cost resulting from the operation of freezing equipment as opposed to the purchase of ice. He did mention, however, that British investigators have found that very little extension of keeping quality is obtained by using antibiotic ice. Thus the use of antibiotics on fishing vessels will not result in an appreciable increase in the time that the vessel can spend on the fishing grounds.

There was a lively discussion of the papers presented at this session. The first contribution was a discussion by the Soviet Union on the operation of their factory vessels. They mentioned that Russian stern-trawling factory vessels have been in operation since 1955 and that the operation of these vessels is quite satisfactory. The products produced on these vessels consist of frozen eviscerated fish, frozen fish fillets, and byproducts such as fish meal and oil. The livers of cod are also saved. The productivity of these freezer trawlers is 60 percent higher than conventional trawlers; also the operating costs are 18 percent less than conventional trawlers. It was also stated that more research on preservation of fish is needed to find a method that will make it possible to transport considerable quantities of fish without freezing them. Improvements in vessel design are necessary to overcome stability problems and permit successful use of refrigerated sea water on long-distance vessels. The Russian presentation seemed to be a fair appraisal of factoryship operation, and to be of considerable interest to the group. There is no question that this type of operation will result in quite a change in the world fisheries picture in future years.

Birkhoff of Germany mentioned that he doubts that factory trawlers are economical because of the low price received for frozen fish and the high labor costs

associated with handling frozen fish at sea. There would be more chance of economic success by having a factory vessel act as a mothership and receive the catch from smaller trawlers, rather than using the factory vessel as the catching vessel. An economic appraisal of the operation of factory trawlers and motherships would be very interesting. Also in regard to factoryships, Harper Gow, who has an interest in the vessels Fairtry I and Fairtry II, gave an account of the development of those vessels. He mentioned that the Fairtry I has completed about four trips per year in the past four years. The operation of this vessel was so satisfactory that they built the Fairtry II which, while essentially the same as the Fairtry I, does contain some improvements designed to solve some of the problems that were found in operating the first vessel. These consist of minor modifications in the stern-trawling gear and chute to prevent the gear from catching in the propeller, enlarged facilities for filleting the fish, and equipment for producing larger quantities of fish meal and oil. In this type of an operation the production of fish meal and oil often spells the difference between profit and loss. It was mentioned that in spite of the increased labor costs it is better to land the majority of the catch as frozen packaged fillets rather than as eviscerated fish, frozen in block form. About 75 percent of the fish caught by the "Fairtry" vessels are now being filleted and frozen on the vessel. The remainder are being frozen as eviscerated fish in block form, or are being processed into fish meal and oil. Each "Fairtry" vessel has 4 to 5 filleting machines and a crew of 80 men to operate the processing equipment.

Gow also mentioned that at first personnel problems almost resulted in termination of this venture, but incentive payments and liberal vacation plans ended these problems. There is one other relatively minor problem in stern fishing; namely, the difficulty in hauling large catches aboard the vessel. It is extremely difficult to "split the bag" as is done on conventional side-fishing trawlers. He believes that it will be possible to solve this problem in the near future.

Eddie, in his discussion, agreed that new vessels should be used for freezing fish at sea; present vessels cannot be satisfactorily converted for this purpose. He also mentioned that at the Torry Research Station they have found that fish can be satisfactorily frozen, thawed, and re-frozen without any loss of quality. Also fish can be satisfactorily frozen in a pre-rigor condition. British and United States investigators are now in substantial agreement on many aspects of freezing of fish at sea. In fact the Torry Research Station is having a new freezer-trawler designed by a naval architect. This trawler will use vertical plate freezers to freeze eviscerated cod in blocks. The fish will be stored at -20° F. in the vessel's hold.

In summary, in this session on productivity it was pointed out that factory freezing vessels are meeting with considerable success in many countries. There is, however, a serious question of whether these vessels will be suitable for all countries; economic and political factors within individual countries will largely determine the appropriateness of operation of these vessels.

ATOMIC FISHING BOAT OF THE FUTURE: A somewhat speculative paper on the possible design of a Japanese atomic fishing vessel was presented by Takagi of Japan. It pointed out that Japan now has 157,000 powered fishing vessels using coal or oil. It will in the near future be necessary for these vessels to go farther and farther away from port to fully utilize their hold capacity. Tagaki stated that in many cases the limited fuel capacity restricts the cruising radius of these boats. Atomic propulsion would enable the vessels (motherships) to cruise for several years at a time unloading fish to large carrier vessels or at other ports of the world.

Japan would like to put an atomic power plant of 8,000 hp. on a 285-foot long oceanographic research vessel. This vessel would have rooms for over 1,000 people. They also have in mind the outfitting of a smaller 5,000-gross-ton training ship with an atomic power plant. This vessel would be used for training students in

oceanography. In concluding, Takagi mentioned that proposals for outfitting the aforementioned vessels with atomic power are being considered by the Japanese Government. He hopes that these projects, if approved and successfully carried out, will provide a basis for the construction of atomic-powered fishing vessels in Japan.

NOTES ON PERSONAL DISCUSSIONS: Much valuable information was received as a result of conversations with naval architects, engineers and fishery technologists attending the congress.

Heen of FAO mentioned that two freezing vessels of about 150 feet in length are now operating out of Norway. These vessels are landing both frozen eviscerated fish and frozen fillets (packaged in 5- and 10-pound packages). Also at the Fisheries Research Laboratory at Bergen, Norway, studies are being conducted on the development of a vertical plate freezer for freezing fish fillets at sea in block form. This freezer has been tested at the laboratory with some degree of success, and will soon be tested at sea on a commercial trawler.

I talked to Jerzy Kukucz, Professor of Fish Technology, Polytechnic School, Danzig, Poland. He is the head of a new fish technology department that was established at that University about a year ago. At the present time about 165,000 metric tons (364 million pounds) of fish are landed annually in Poland. Within the next ten years it is planned to increase these landings to about 500,000 metric tons (1.1 billion pounds). This will be done by using stern trawlers similar to those of the Russian type. These factory vessels will produce frozen fillets and fish meal and oil. Attempts are now being made to start a frozen food distribution system in Poland; this is needed to increase the distribution of the frozen fish that will be landed by the factory vessels. It was also mentioned that present freezing and frozen storage facilities in Poland are very inadequate.

I also talked to William MacCallum, Fisheries Research Engineer, Fisheries Research Board of Canada, Technological Station, Halifax, Nova Scotia. At the present time his station is conducting studies on the preservation of groundfish in refrigerated sea water. In addition bacteriological, protein, and fish meal and oil studies are being conducted at that station. Results of some preliminary tests on storing haddock and ocean perch in refrigerated sea water show that these fish are of no better quality than fish stored in ice. In fact in some cases the fish stored in sea water were of lower quality than those stored in ice. More extensive experiments on the use of refrigerated sea water are planned. MacCallum also mentioned that the results of other studies conducted at the Halifax station show that there is no appreciable increase in the keeping quality of groundfish due to the use of antibiotic ice. This contradicts the favorable results obtained by Tarr and his co-workers. Other tests on frozen packaged cod and haddock show that those fish should not be stored at 0° F. for longer than 6 months. Results of United States studies show that storage for 9 to 12 months at 0° F. is satisfactory, provided the product is of high quality when frozen. MacCallum also mentioned that they are planning to initiate studies on the development of equipment for improving the handling of fish on the vessel and at the dock.

Gordon Eddie, the principal engineer and a scientific officer at the Torry Research Station at Aberdeen, Scotland, and I had considerable discussions concerning the differences in our projects on freezing fish at sea. The English are having a new freezer-trawler designed, and they are trying to "sell" freezing fish at sea to industry. Several large firms in England are showing considerable interest in this process. Eddie is quite optimistic about its use in the very near future. Eddie and his co-workers have also taken a look at the use of refrigerated sea water for white fish. Results so far show no increased keeping quality for refrigerated sea water-stored fish over that of regular iced fish. They have also found that fish stored in refrigerated sea water for ten days or more contain large amounts of spoilage bac-

teria. Tests are being continued. Studies at Torry on the use of antibiotic ice for storing fish on the vessel show a three-day extension in the keeping quality of the treated fish (at a very low level of quality) is possible over that of regularly-iced fish. No work is being done at Torry on the development of equipment for improving the handling of fish. It is interesting to note that we are the only fisheries research organization that is doing work of this type.

In other conversations I learned that an Italian firm is now outfitting tuna vessels for catching tuna off the coast of Morocco. The fish will be eviscerated and stored in ice on the vessel. Arcoulis of Greece, the operator of several Greek freezer trawlers, was quite enthusiastic about freezing fish at sea. He is blast-freezing large quantities of groupers and sea bream on vessels that are fishing off the western coast of Africa.

Information was obtained on a preliminary design of a 147-foot Dutch stern trawler. The vessel has a chute with a safety door and a completely sheltered deck for handling the fish. The fish hauled up in the net are dropped to the lower deck where they are gutted, washed, and iced in the hold. This type of vessel offers many advantages as a New England freezing-fish-at-sea trawler.

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Part III - Fish Quality Stressed

By Joseph W. Slavin*

CARE OF THE CATCH: Methods of retaining the quality of the catch so as to increase the productivity of the vessel and the acceptability of the fish were discussed in some detail at the congress. In introducing the paper on "The Care of the Catch," Eddie of the Torry Research Station, acting in the absence of the authors, pointed out that fish preservation problems for each area of the world vary considerably. Methods of preservation suitable for one fishery or country therefore may not have the same relative value when applied to another fishery, where conditions differ. This is a salient point and explains why from time to time there are what seem to be conflicts between research results obtained from different countries.

This paper is principally concerned with the control of fresh fish spoilage on the vessel through the use of proper handling, washing, and icing procedures. Temperature is the most important single factor affecting spoilage; therefore the fish must be iced as soon as possible after catching, using a ratio of at least 1 part of ice to 3 parts of fish. British distant-water trawlers, because of the long period at sea, use a ratio of ice to fish of about 1 to 1. In addition to employing sufficient quantities of ice, proper application of the ice is essential for maintenance of quality. The ice should therefore be deployed so as to be mixed thoroughly with the fish and to also provide an effective barrier between the hold surfaces and the fish. Also, important are the observations that (1) deckhead refrigerated grids should be used only to cool the ice on the way to the fishing grounds, (2) the fish hold should be shelved off at 18- to 30-inch intervals to prevent excess pressure and weight loss in the bottom layers of fish, and (3) bacteriological spoilage of the fish may result from using contaminated ice. In this latter instance antibiotics may be of value in the suppression of bacterial multiplication in the ice. The importance of cleanliness in the fish holds is also emphasized, even though the exact value of this practice cannot always be directly measured. In this connection easy-to-clean metal-lined fish holds are preferred over the conventional wooden-lined holds.

FISH ROOM--ENGINEERING AND ARCHITECTURE: "The Fish Room--Engineering and Architecture," by MacCallum contains a wealth of technical information on the design and construction of fish holds that will be of considerable value to the naval architect in designing new and efficient fishing trawlers. In introducing his

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paper, MacCallum pointed out that naval architects can perform a great service for fishermen and vessel owners by designing vessels which will enable storage and handling of the catch under optimum conditions. His observations were that in the design and construction of the holds of fishing trawlers (1) the proper type and thickness of insulation should be used to reduce ice melting, (2) waterproof membranes should be used on the warm side of the insulation, (3) stanchions should be arranged so that all movable pen boards are interchangeable, (4) hatches should be large enough to permit rapid unloading of the catch, and (5) the inside of the hold should be coated with suitable paint or resin compounds or lined with corrosion resistant alloys.

Data is presented in this paper (1) on the insulation requirements for the fish holds of both large and small vessels and (2) on the effect of insulation thickness on the quantity of ice that must be carried to adequately preserve the catch. Information is also given on methods for determining optimum fish-hold size and on the evaluation of various types of insulating materials, coating compounds, waterproof membranes, aluminum alloys, and other materials. Techniques employed in the construction of fish holds for both large and small vessels are also discussed in some detail.

ICING VERSUS FREEZING: The paper on "Icing Versus Freezing" is an objective comparison of the advantages and disadvantages of freezing or icing of groundfish aboard the fishing trawler. In introducing this paper the author pointed out that naval architects, engineers, and vessel owners and operators must, prior to designing a vessel for freezing or icing fish at sea, carefully consider the effect that these procedures will have on handling aboard the vessel, storage capacity of the vessel, unloading and handling ashore, quality and acceptability of the product, and on the costs of operation. The author, also mentioned that fish preservation and handling problems of different areas sometimes vary considerably; thus freezing at sea may offer special advantages for certain areas, and icing at sea may offer similar advantages for other areas.

In making the study of icing versus freezing, the author used as a basis the United States experimental freezing trawler Delaware and the British freezer trawler Northern Wave. On the Delaware, round haddock and cod were brine-frozen prior to rigor mortis, stored whole in the vessel's hold, unloaded by conventional means, and stored at 0° F. ashore. When removed from storage they were thawed in circulating water, filleted, and the fillets packaged, refrozen, and marketed in the conventional manner. In the Northern Wave project cod were eviscerated at sea, stored with ice, and then after rigor mortis set in plate-frozen in the form of fish slabs. The rectangular slabs of fish were then stored at -20° F. in the vessel's hold and after unloading at the same temperature ashore. Upon removal from storage the slabs of frozen fish were thawed in circulating air, the fish filleted, and the fillets marketed in the chilled or smoked state. It is pointed out that fish frozen at sea on the Delaware and the Northern Wave were of acceptable quality after 8 months of frozen storage.

In his analysis the author stated that freezing fish at sea on the experimental vessels resulted in increased handling aboard the vessel, reduction of the capacity of the vessel, an increase in the time required to unload the vessel, and increased handling at the shore plant--as compared with icing on the vessel. Increased costs may also result from freezing at sea due to extra personnel, higher vessel cost, operation and maintenance of freezing equipment, and frozen storage and associated handling costs ashore. However these costs may well be offset by the advantages associated with freezing at sea; namely, maximum utilization of the vessel's hold every trip, the landing of fish of uniformly high quality, and the storage of frozen fish ashore for use to level out production during slack periods. Thus freezing at sea may be most applicable for a combined vessel-processing plant operation. The author also recommended that new vessels be built for freezing groundfish at sea, rather than convert existing trawlers. In concluding, the author mentioned that in

this connection the U. S. Bureau of Commercial Fisheries has worked up a preliminary design of a new 170-foot freezer trawler which will freeze 3,000 pounds of fish per hour and will have a capacity of over 250 tons of round brine-frozen fish.

OTHER RELEVANT PAPERS: Eric Heen, Chief of the Fisheries Technology Branch of FAO acted as rapporteur and referred to other papers relevant to those on fish quality. In this connection the papers on "Design Studies of Stern Trawlers," by Heinsohn, "Modern Refrigerated Factory Ships in Japan," by Soto, and "Propulsion and Processing Machinery for Deep-Sea Trawlers," by Eddie were most interesting. The latter paper is particularly applicable because it points out that if freezing at sea is employed, it is not necessary for the vessel to return to port as quickly as if icing procedures are used. Thus a cost savings can be obtained in operating a freezer-trawler by reducing the size of the propulsion machinery and the speed of the vessel. In concluding, Heen stressed that much work has been done on the use of antibiotics for fish and their application must be closely appraised; also chilling in refrigerated sea water has been accepted for species of fish such as tuna, mackerel, salmon, and halibut and should be investigated for other species.

FISH HOLDS: The discussions on the session on Fish Holds were for the most part broken down into the subjects of "Chilling" and "Freezing."

Chilling: In his written discussion, the Director, Fishing Industry Research Institute, Capetown, South Africa, referred to some of the important work being done at that station. Of particular interest is the observation that reducing the size of the crushed ice to small pieces of $1\frac{1}{2}$ inches square does not increase the cooling rate of the fish. However, the use of very small pieces of flake ice does result in an increase in the cooling rate. Other salient points are that the ratio of fish to ice should be 1:1 for South African vessels to enable maximum fish-quality retention, and the weight loss for the fish stored at the bottom of the pen is 3 to 7 times greater than that for the fish stored at the top of the pen. Information was also given on the fish wash flume that is now in use on South African trawlers and on current preservation research studies being conducted at Capetown.

Commodore Silva of Portugal mentioned that fish can be satisfactorily kept in ice aboard Portugal trawlers for 10 to 12 days. Many of these trawlers employ mechanical refrigeration to keep the ice from melting on the way to the fishing grounds; the refrigeration is shut off when icing of the fish begins.

Other contributors pointed out that fish-hold linings should be resistant to bacteria, durable, and easy to clean. They stressed the importance of plastics and special varnishes and resins for coating the hold. It was also reported that chlorinated sea water is being used aboard trawlers in the United States and that sea water containing 60 parts per million of free chlorine is effective in washing the eviscerated fish prior to icing, and in washing the vessel's hold in port. This method is finding wide acceptance in the New England fishing industry. Differences in the apparent keeping quality of ice-stored groundfish due to geographical location were also discussed. It appears that in some countries people are accustomed to a somewhat stale fish and therefore prefer it to a fresh relatively bland product; this accounts for some of these differences.

Freezing at Sea: Much interest was shown in the freezing of fish at sea, and there were many valuable contributions on this subject. Of particular interest was a discussion on "Quick Freezing at Sea" delivered by Gino Gianesi, a consulting engineer from Italy. He pointed out that several Mediterranean fishing vessels have been equipped with quick-freezing installations to fish in the Atlantic Ocean, in the tropical waters off West Africa. The fish (consisting of sea bream, groupers and other species common to the West Coast of Africa) are usually gutted, washed, put into boxes, and loaded directly into the vessel's low-temperature blast freezers,

where they are frozen in about three hours. After freezing they are transferred to a -5° to -13° F. refrigerated hold. These fish are usually marketed in the frozen state in Greece and other Mediterranean countries. Gianesi also reported that the frozen fish are of good quality even after seven months of storage and that this activity has given excellent results and is considered to be out of the experimental stage. The author also pointed out that the 124-foot Greek transport vessel Euridiki converted to a freezer trawler in 1951 was perhaps the first vessel to be used commercially for quick-freezing at sea. This vessel is equipped with an ammonia-compression refrigeration system having a capacity of about 60 tons of refrigeration. Two air-blast freezers operating at temperatures as low as -49° F. are used to freeze about 6 tons of fish a day. Over 120 tons of frozen fish can be stored in the -4° F. to -13° F. refrigerated fish hold. Successful operation of this vessel resulted in conversion by this company of two larger 229-foot trawlers each having a freezing capacity of 15 tons of fish a day and a frozen fish hold about three times the size of the Euridiki. Three other vessels were then converted to freezerships by another Greek fishing concern. They are the Evangelistria I, II, and III. The first, a converted mine sweeper, is 157 feet long, has an ammonia-compression refrigerating plant with a capacity of 120 tons of refrigeration, and will freeze 12 tons of fish per day in four air-blast quick freezers. This vessel has two refrigerated holds with a total capacity of about 230 tons of frozen fish. The Evangelistria II and III are about 177 feet long and have freezing systems very similar to that of the Evangelistria I. They each have a freezing capacity of 14 to 15 tons of fish a day and a storage capacity of about 300 tons of frozen fish. In concluding, Gianesi mentioned that quick-freezing at sea can now be considered as practical and perfectly safe and that it will be developed in the future, especially in areas where traditional fishing activities along the coast are declining.

Elie Arcoulis, Managing Director of The Evangelistria Company, the owner of several of the Greek-freezer trawlers described, commented on some of the aspects of icing versus freezing. He mentioned that the work on the Delaware and the Northern Wave was experimental and therefore cannot be used as a true basis for determining the economics of freezing fish at sea. They have found in Greece that freezing increases the productivity of the vessel and that the frozen fish can be handled faster than can iced fish. Thawing of the fish in air can be accomplished satisfactorily and with little difficulty. In general, Arcoulis was quite enthusiastic about freezing at sea and reported that this process was meeting with considerable success in Greece.

The remaining contributions were concerned with some of the more controversial aspects of freezing fish at sea. Eddie of the Torry Research Station in Aberdeen, Scotland, mentioned that in the Delaware project they were lucky to get away with brine-freezing; this process was tried in Europe many years ago and was found to be unsatisfactory, the fish being of poor appearance and quality. He also mentioned that the results of the Delaware and Northern Wave projects could not be compared directly since there were different experimental objectives for each study and because of the differences in the fisheries. In a more detailed written statement, Eddie made the interesting observation that the Northern Wave fish were soft because of biological factors owing to catch areas, not because of the freezing process. Eddie also pointed out that the costs of unloading frozen fish from the Northern Wave were less than that for wet fish, water-thawing is not acceptable for large cod where appearance and texture are important, fish can be satisfactorily frozen in a pre-rigor condition, dielectric thawing of frozen fish is being investigated in order to reduce thawing time and costs, and the use of freezing at sea reduces the need for high vessel speed; thus a savings in propulsion machinery can be effected. He also emphasized that freezing at sea need not result in slower handling, although one or two extra men may be required. The advantage of maximum utilization of capacity on every trip may result in capital savings in the number of vessels required to produce a given quantity of edible fish. It was most interesting to note that United

States and British investigators while differing on some of the details concerning freezing at sea, were in substantial agreement on many of the major issues.

In other discussions, Rankine of the United Kingdom emphasized that frozen fish should be stored at -20° F. on the vessel. He also stated that the freezing capacity of the Delaware can not be compared directly with that of the Northern Wave because of the iced-buffer storage used on the latter vessel. In addition, he gave some very interesting information on a modified plate-freezing installation for a new freezership.

The problem of consumer acceptability of sea-frozen fish was expressed by several participants. Parkes of England said that in the United Kingdom a 190-foot trawler was outfitted for freezing at sea. The frozen fish consistently sold for less money than did the iced fish, as a result the project was an economic failure. Heinsohn of Germany, the designer of several large stern trawling factoryships, commented that sea-frozen fish while being of excellent quality are still difficult to market in Germany and in many cases they sell for lower prices than do iced fish. There is, however, much more consumer demand for sea-frozen fillets than for sea-frozen eviscerated fish landed in blocks. This point was also stressed by Gow of England in his discussion of the operation of the factoryships Fairtry I and II.

SUMMARY: These discussions emphasize the need for employment of fish preservation and handling practices that are best suited for the particular fishery in question. For example, in certain fisheries, where vessels are now returning to port half empty, freezing fish at sea may be the solution. In other fisheries it may be more desirable because of quality and marketing aspects to keep the fish in a fresh condition using sufficient quantities of ice, or in some cases, refrigerated sea water. There is no doubt that more effective tailoring of fish preservation techniques to meet industry requirements will do much to solve current problems of low production and high costs.

APPENDIX - LIST OF PAPERS PRESENTED AT THE SECOND WORLD FISHING BOAT CONGRESS

Topic: TACTICS

Session: Fishing Methods and Deck Arrangement

PRINCIPAL FISHING BOAT TYPES, by A. C. Hardy, London, E. C. 2, England.

NOMENCLATURE AND SYMBOLS, by H. Svenkerud, Naval Architect, FAO, Rome, Italy.

DRIFT-NETTING: DECK DESIGN AND EQUIPMENT, by J. G. de Wit, Deputy Inspector of Fisheries, Ijmuiden, Netherlands.

GILL NET FISHING: DECK DESIGN AND EQUIPMENT, by Thomas E. Colvin, Naval Architect, Waukegan, Illinois, U. S. A.

LONGLINE FISHING: DECK DESIGN AND EQUIPMENT, by Yoshiaki Kanasashi, President, Kanasashi Shipbuilding Co. Ltd., Shizuoka Prefecture, Japan; Chomatsu Doke, Director, Miho Shipyard Co. Ltd., Shimizu City, Shizuoka Prefecture, Japan; Seigoro Chigusa, Director, Nissin Kogyo Co. Ltd., Nakanoshima, Kita-ku, Osaka, Japan.

POLE AND LINE FISHING: DECK DESIGN AND EQUIPMENT, by Shogo Muramatsu, Chief, Design Section, Yaizu Shipbuilding Co., Ltd., Yaizu City, Shizuoka Prefecture, Japan.

TRAWLING: DECK DESIGN AND EQUIPMENT, by A. von Brandt, Director, Institut für Netzforschung, Hamburg, Germany; C. Birkhoff, Rickmers Werft, Bremerhaven, Germany.

TWO NEW TRAWLERS FOR THE NORTH PACIFIC, by Dayton Z. Alverson, U. S. Bureau of Commercial Fisheries, Seattle, Washington, U.S.A.; Peter G. Schmidt, Jr., President, Marine Construction and Design Company, Seattle, Washington, U. S. A.

DES BATEAUX DE PECHE SICILIENS SPECIALISES (Specialized Sicilian Fishing Boats); by Nito Fodera, Directeur, and Raimondo Sara, both du Centre Experimental Pour l'Industrie de la Peche et des Produits de la Mer, Section Technologique, Palermo, Sicilie; Alberto Cambiano, Architecte Naval, Institut Nautique, Palermo, Sicilie.

Session: Command of Operations

CENTRALIZED CONTROL OF TRAWLERS, by A. C. Hardy, London, E. C. 2, England. H. E. H. Pain, S. G. Brown Ltd., Watford, Herts, England.

Topic: CONSTRUCTION

Session: Scantlings

STEEL AND WOOD SCANTLING TABLES (WESTERN COAST OF U. S. A.), by H. C. Hanson, Naval Architect, Seattle 4, Washington, U.S.A.

SUGGESTED STANDARD SCANTLINGS, by Dwight S. Simpson, Naval Architect, Boston 10, Massachusetts, U. S. A.

COMMENTS ON PAPER NO. 10--SUGGESTED STANDARD SCANTLINGS--SIMPSON, by D. A. S. Gnanadoss, Assistant Director of Fisheries, Madras, India.

Session: New Materials:

GLASS REINFORCED PLASTIC HULLS, by Patrick D. de Laszlo, Director, Halmatic Ltd., Portsmouth, England.

Session: Fish Holds:

THE CARE OF THE CATCH, by G. A. Reay, Director, and J. M. Shewan, both of Department of Scientific and Industrial Research, Torry Research Station, Aberdeen, Scotland.

THE FISH ROOM - ENGINEERING AND ARCHITECTURE, by W. A. MacCallum, Research Engineer, Fisheries Research Board of Canada, Technological Station, Halifax, Nova Scotia, Canada.

ICING VERSUS FREEZING, by Joseph W. Slavin, Acting Chief, North Atlantic Technological Research, U. S. Bureau of Commercial Fisheries, East Boston 28, Massachusetts, U. S. A.

Session: Installation of Machinery:

PROPULSION ENGINES FOR FISHING BOATS, by Ivar Stokke, Head, Department of Internal Combustion Engines, The Technical University of Norway, Trondheim, Norway.

STEAM VERSUS DIESEL, by G. Hopwood, Chief Engineer, Mirrlees, Bickerton and Day Ltd., Cheshire, England; N. W. N. Mewse, Marine Superintendent, J. Marr and Son Ltd., Fleetwood, Lancashire, England.

PROPULSION SYSTEMS FOR MOTOR TRAWLERS, by Franz Süberkrüb, Consulting Naval Architect, Hamburg, Germany.

RECENT TRAWLERS FITTED WITH MULTIPLE REDUCTION GEARS, by Alexandre Chardome, Civil Engineer and Manager, Beliard, Crighton and Co., Ostend, Belgium.

DEVICE FOR RAISING AND LOWERING PROPELLERS, by Keigo Inamura, Chief, Fishing Boat Section; Motojiro Ninomiya, Chief, Engine Branch, Fishing Boat Section; both of Fisheries Agency, Kasumigaseki, Chiyodu-ku, Tokyo, Japan.

Session: Costs of Construction:

AN ANALYSIS OF DIMENSIONS, WEIGHTS AND COSTS, by Harry Benford, Associate Professor; Miklos Kossa, Naval Architect; both of the Department of Naval Architecture and Marine Engineering, University of Michigan, Ann Arbor, Michigan, U. S. A.

Topic: SEA BEHAVIOR

Session: Resistance:

COMMENTS ON HULL FORM DESIGN OF FISHING BOATS, by H. I. Chapelle, Curator, Division of Transportation, Smithsonian Institution, United States National Museum, Washington 25, D. C., U. S. A.

MODEL TESTS OF SOME FISHING LAUNCHES, by Thomas C. Gillmer, Associate Professor of Marine Engineering, U. S. Naval Academy, Annapolis, Maryland, U. S. A.

REVIEW OF B. S. R. A. TRAWLER RESEARCH, by H. Lackenby, Chief Naval Architect, The British Shipbuilding Research Association, London, England.

AN ADVANCED HULL AND PROPELLER DESIGN, by J. Thomas Tothill, Naval Architect, Ship Laboratory, National Research Council, Ottawa, Canada.

STATISTICAL ANALYSIS OF RESISTANCE DATA FOR TRAWLERS, by D. J. Doust, Naval Architect, Ship Division, National Physical Laboratory, Feltham, Middlesex, England.

COMMENTS ON THE PAPER "STATISTICAL ANALYSIS OF RESISTANCE DATA FOR TRAWLERS," by D. J. Doust; by Norio Fujinami, Naval Architect, FAO, Rome, Italy.

THE LOADS IMPOSED BY TRAWLING GEAR, by W. Dickson, Senior Scientific Officer, Marine Laboratory, Torry Research Station, Aberdeen, Scotland.

SOME TURKISH FISHING BOATS, by Ata Nutku, Professor of Naval Architecture, Technical University, Istanbul, Turkey.

Session: Seakindliness:

NEW PERSPECTIVES IN SEA BEHAVIOR, by G. Vossers, Head, Seakeeping Laboratory, Netherlands Ship Model Basin (N. S. M. B.), Wageningen, Netherlands.

BEHAVIOR OF TRAWLERS AT SEA - II, by Walter Möckel, Captain, Naval Architect, Hamburgische Schiffbau-Versuchsanstalt, Hamburg 33, Germany.

REMARKS ON THE SHAPE OF DUTCH COASTAL FISHING BOATS, by W. Zwolsman, Naval Architect, Holland Launch N. V., Zaandam, Netherlands.

TESTS WITH A TRAWLER MODEL IN WAVES, by J. D. van Manen, Under-Director; G. Vossers, Head, Seakeeping Laboratory; H. Rijken, Naval Architect; all of Netherlands Ship Model Basin, Wageningen, Netherlands.

THE PRISMATIC COEFFICIENT, by Jan-Olof Traung, Chief, Fishing Boat Section, Rome, Italy.

TRAWLER FORMS WITH BULBOUS BOWS, by D. J. Doust, Naval Architect, Ship Division, National Physical Laboratory, Feltham, Middlesex, England.

TESTS OF FISHING BOAT MODELS IN WAVES, by Kaname Taniguchi, Chief, Nagasaki Experimental Tank Laboratory, Mitsubishi Shipbuilding and Engineering Co. Ltd., Nagasaki, Japan.

Session: Stability:

NOTES ON STABILITY, by Atsushi Takagi, Professor, Department of Naval Architecture, Faculty of Engineering, University of Tokyo, Bunkyo-ku, Tokyo, Japan.

TRANSVERSE STABILITY OF TUNA CLIPPERS, by John Randolph Paulling, Jr., Assistant Professor of Naval Architecture and Marine Engineering, University of California, Berkeley, California, U. S. A.

A METHOD TO DETERMINE FREEBOARD IN RELATION TO STABILITY, by Olgierd Jablonski, Naval Architect, The Maritime Institute, Gdansk, Poland.

SAFETY FROM CAPSIZING, by Kurt Wendel, Professor of Ship Design and Theoretical Naval Architecture, Technical University of Hannover, and University of Hamburg, Germany.

Session: Safety at Sea:

CAUSES OF ACCIDENTS, by Wm. C. Miller, Naval Architect and Marine Engineer, Wm. C. Miller and Associates, San Diego 1, California, U. S. A.

Topic: PRODUCTIVITY

Session: Symposium of Boat Types:

DEVELOPMENT OF A BOAT FOR INDIA'S SURF COASTS, by Peter Gurtner, Naval Architect (India), Organization of the United Nations FAO, Rome, Italy.

COMMERCIAL OUTBOARD FISHING CRAFT, by David D. Beach, Naval Architect, Waukegan, Illinois, U. S. A.

PHILIPPINE FISHING BOATS, by Santos B. Rasalan and J. B. Malig, both of Bureau of Fisheries, Manila, Philippines; Ildefonso Lachenal, President, Luzon Slipways, Navotas, Rizal, Philippines.

TRADITIONAL JAPANESE SMALL FISHING CRAFT, by Yoshinori Otsu, Chief; Nobutatsu Yokoyama, Chief, Hull Branch; Tsutomu Kobayashi, Naval Architect; all of Fishing Boat Laboratory, Fisheries Agency, Tsukishima, Tokyo, Japan.

DESIGN AND MASS PRODUCTION OF SHRIMP TRAWLERS, by L. C. Ringhaver, President, Diesel Engine Sales, Inc., St. Augustine, Florida, U. S. A.

DEVELOPMENT OF A TRAWLER OF UNORTHODOX DESIGN, by E. C. B. Corlett, Managing Director, Burness Corlett and Partners Limited, Naval Architects and Marine Consultants, Worting and London, England; J. Venus, Managing Director, Seawork Limited, London, Managing Director, P. K. Harris (Shipbuilders) Ltd., Appledore, Managing Director, T. E. Mitchison Ltd., Gateshead-on-Tyne, England.

THE NETHERLANDS POST-WAR FISHING FLEET, by P. Boogaard, Chief, Shipping Department, Ministry of the Building Industry, Rotterdam, Netherlands.

DESIGN STUDIES FOR STERN TRAWLERS, by Heinz Heinsohn, Rickmers Werft, Bremerhaven, Germany.

DIESEL WHALE CATCHERS, by Tomijiro Nakata, Chief, Design Division, Hayashikane Shipbuilding and Engineering Co. Ltd., Shimonoseki City, Yamaguchi Prefecture, Japan.

MODERN REFRIGERATED FACTORYSHIPS IN JAPAN, by Shigeru Sato, Chief, Design Section, Hitachi Shipbuilding and Engineering Co. Ltd., Innoshima Shipyard, Innoshima, Hiroshima Prefecture, Japan.

Session: Choice of Size and Type:

CHOICE OF BOAT TYPE AND SIZE FOR POLISH DEEP-SEA FISHERIES, by Jerzy Swiecicki, The Maritime Institute, Gdansk, Poland.

PROPULSION AND PROCESSING MACHINERY FOR DEEP-SEA TRAWLERS, by G. C. Eddie, Torry Research Station, Aberdeen, Scotland.

NAVIRES FRANCAIS DE GRANDE PECHE SALEE, by E. R. Gueroult, Architecte Naval, Paris 2e, France.

DES BATEAUX DE PECHE SICILIENS SPECIALISES, by Alberto Cambiano, Architecte Naval, Institut Nautique, Palermo, Sicilie; Vito Foderá, Directeur, and Raimondo Sará, du Centre Expérimental pour l'Industrie de la Pêche et des Produits de la Mer, Section Technologique, Palermo, Sicilie.

POINT DE VUE d'UN ARMATEUR DE BATEAUX DE PECHE, by L. Soublin, President de la Federation des Armateurs a la Peche, Fecamp (Seine-Maritime, France).

AN ECONOMIC AND FINANCIAL STUDY OF THE FLUKE OTTER-TRAWL FISHERY OF NEW JERSEY

By Frans L. Widerstrom, Jr.*

ABSTRACT

A large part of the New Jersey summer flounder or fluke fishery is found in the southern part of the State. The inshore fleet is composed of older, small boats (less than 40-foot length) and newer medium-sized vessels (40- to 49-foot length). Nearly all of the medium craft were built in the postwar period and represent the more efficient segment of the inshore fleet.

Offshore vessels range from 55 to over 100 feet in length. Gross receipts, net profit, and return on investment indicate that the offshore fishery is the most profitable despite the large initial investment required.

BACKGROUND

Otter trawlers known as "draggers" were not successfully operated from New Jersey ports until some time after World War I; as late as 1921 their number did not exceed a dozen. However, the proven efficiency of the otter trawl forced the eventual replacement of older types of gear such as hand lines and pound nets. More recent developments in the size and composition of the New Jersey dragger fleet are indicated in table 1.

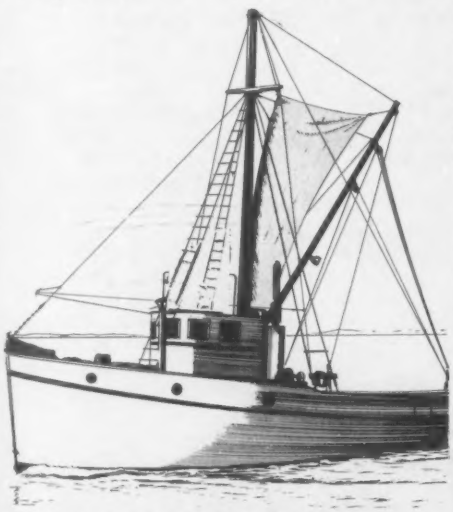

Fig. 1 - Small New Jersey fluke otter trawler or dragger (less than 40 feet, length over-all).

Table 1 - Two-Year Comparison of New Jersey Otter-Trawl Fleet

Item	1955	1957
	(Number)	
Motor vessels (5 net tons and over)	164	158
Motor boats (less than 5 net tons)	62	24
Otter trawlers by Counties:		
Atlantic	40	28
Cape May	114	85
Monmouth	32	34
Ocean	40	35
Total	226	182

The importance of the fluke fishery to the New Jersey otter-trawl fleet is summarized in table 2.

The total ex-vessel value of the catch landed by the otter-trawl fleet during 1957 in New Jersey was $1.8 million. Flounders, nearly all fluke, accounted for about 46 percent of the total catch value; scup, 17 percent; sea bass, 8 percent; and northern lobster, 9 percent. The remainder was composed of some 40 other commercial species.

Table 2 - New Jersey Otter-Trawl Fleet Landings of Leading Commercial Species, 1957

Species	Quantity	Ex-vessel Value
	1,000 Lbs.	$1,000
Fluke and mixed flounders	5,120	842
Scup (porgy)	6,461	320
Sea bass	1,399	160
Northern lobster	546	172
Other	8,202	349
Total	21,728	1,843

*Commodity-Industry Economist, Branch of Economics, Division of Industrial Research and Services, U. S. Bureau of Commercial Fisheries, Washington, D. C.

The three leading counties produced all of the fluke catch landed by New Jersey otter trawlers. Most of the fluke was caught by otter trawlers, but a small quantity was caught by other gear.

Cape May County was dominant in the New Jersey flounder fishery during 1957. Its 85 otter trawlers were the largest single fleet of a total of 182 vessels and boats in the State. Of the total New Jersey flounder catch, the Cape May County fleet accounted for 44 percent of the quantity and 42 percent of the value. That is the reason for selecting Cape May County as typical of the New Jersey summer flounder or fluke fishery.

Table 3 - Flounder Landings by the Three Leading Counties of New Jersey, 1957[1/]

County	Quantity	Ex-vessel Value
	1,000 Lbs.	$1,000
Atlantic	1,769	284
Cape May	2,268	358
Ocean	1,115	202
Total	5,143	844

1/ Mostly caught by otter trawlers, but includes a small amount caught by other types of gear.

INSHORE FLUKE OTTER TRAWLERS

SMALL BOAT FLEET: The development of the southern New Jersey fluke fishery started with the conversion of small hand-line and trolling craft to otter trawling. These boats were 25 to 30 feet in length and were powered by means of 20- to 40-horsepower gasoline engines. The abundance of fluke and related species made this small-scale operation profitable from 1925 to 1935. A gradual replacement of small boats was begun prior to World War II. However, many of the craft continued in use for the duration of the war because of material shortage and construction restrictions. Partial modernization was accomplished during the war by repowering with Diesels and by replacing the rope-towing warps with wire. The small draggers that remain active at this time are manned by two men. Current fleet additions are of a larger size.

Fig. 2 - Medium New Jersey fluke otter trawler or dragger, shrimp-boat style (40-to 49 feet, length over-all).

Fishing Gear: The inshore trawlers fish two distinct trawl nets, depending upon the species sought. The fluke or flatfish net has a rather large mesh and is designed to be towed at slow speed. The round fish trawl net has a smaller mesh and longer wings. The inshore boats carry both types of nets and may fish for flatfish or round fish during the day if one type of fishing proves unproductive. The emphasis is on fluke fishing, however, because of its higher market value.

Fishing Operations: A combined 1957 operational statement for three of the small trawlers is shown in table 4. The actual fishing season extends from May to October.

Table 4 - Average Receipts, Expenditures, and Net Returns for Three Selected Small (under 40 feet) Inshore Otter Trawlers (Fishing for Fluke in 1957)		
Average total receipts per boat		$3,105
Expenditures (average per boat):		
Maintenance and repairs including marine railway charges, hull and marine engine repairs, electronic-gear maintenance and painting of a nondepreciable nature	308	
Other operating expenses:		
Diesel and lube oils, ice, grease, etc.	419	
Subsistence at sea for crew	229	
Stevedoring and casual labor	30	
Fishing supplies of nondepreciable nature	99	
Fixed charges:		
Insurance	44	
Depreciation	465	
Fishing licenses and business taxes	43	
Crew shares	396	
Total expenditures and outlay (average per boat)	2,033	
Net profit from 1957 fishing operations per boat		1,072

The gross stock average of the three sample boats reflects the marginal nature of this segment of the New Jersey trawler fleet.

Owners of the small draggers attempt to minimize repairs and replacements by postponing such work or by doing much of the work themselves. Diesel-engine overhauls are expensive and each operator seeks to prolong the period between overhauls.

Daily operating costs are closely controlled. The fishing crew shares in those expenses and it is to the advantage of everyone involved to maintain costs at the absolute minimum.

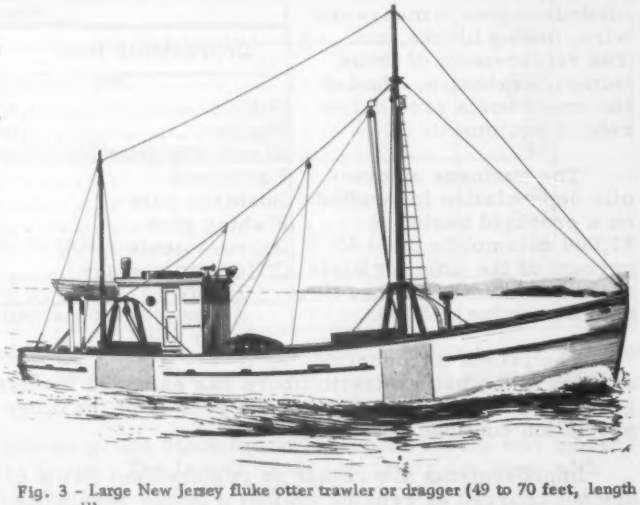

Fig. 3 - Large New Jersey fluke otter trawler or dragger (49 to 70 feet, length over-all).

Fixed charges are met by the owner. The relatively low average insurance premium indicates the small coverage purchased. Hull insurance is considered too expensive. Limited in-port fire insurance and/or some sort of workman's compensation insurance constitutes the insurance coverage. The small scale of the fishing prohibits the establishment of a depreciation reserve account. The owner uses such funds as though they were part of his current earnings. Business taxes include state fishing licenses and the employer's share of employee's Social Security taxes.

The average crew share earnings for 1957 show the general condition of the New Jersey small-boat fishery. Considerable labor difficulty has been encountered by owners in recent years. Alternative employment aboard larger trawlers and clam-dredging vessels has been much more attractive to otter-trawl fishermen aboard the smaller craft.

Capital Investment: The accounting practice with regard to depreciation charges for capital investment is to list separately the purchase price of the boat hull, engine, electronic gear, equipment and fishing gear. The hull is normally charged at a 15-year rate; the engine, 5 years; electronic gear, 3 to 5 years; fishing equipment, 5 years; and fishing gear, 3 years. Although there is some variation in charges, experience has taught that the estimated life very nearly approximates the actual life. A newly-enforced Internal Revenue Service regulation requires that a salvage value be calculated for all charges. Thus, if the estimated salvage value of fishing vessel #1 is $300, the basis for depreciation is $1,200 rather than the full $1,500 capital outlay.

Each of the three boats used in this study is more than 15 years old; two are more than 25 years old. Two of the hulls are listed as being fully depreciated. An annual charge is made on the third only because it was purchased recently. Each buyer is entitled to depreciate his business investment irrespective of what the previous owner had done.

The owners of the smaller fluke trawlers either purchased most of their electronic gear in the immediate postwar period and thus it is fully depreciated, or fish without benefit of those aids. The large initial outlay required for purchases of sounding devices, radiotelephones, loran, etc., is usually prohibitive for the small dragger owners.

Table 5 - Capital Investment in Three Selected Small (under 40 feet) Inshore Otter Trawlers Fishing for Fluke in 1957

Depreciable Item	Fishing Vessel			
	#1	#2	#3	
	($)			
Hull	1,500	-	-	
Engine	500	-	1,200	
Electronic gear	-	375	-	
Equipment	1,021	-	740	
Business auto	-	-	500	
Fishing gear	360	75	525	
Improvements	400	117	610	
Office and storage	-	2,000	1,200	
Total	3,781	2,567	4,775	
Average total investment per boat				3,708

Equipment items include deck gear, winches and wire, towing blocks, etc. The replacement of these items is expensive. Most of the small boats used old or rebuilt equipment.

The business automobile depreciation is handled on a prorated basis. A $1,000 automobile used 40 percent of the time for business, is assumed to have a business value of $400.

The recent introduction of nylon and other synthetic fibers has extended the usable life of many fishing gear items. However, much of the gear is of the older type and the three-year depreciation continues in use.

Improvements are repair or replacement items of a depreciable nature. They are not charged as repairs against a single year's operations.

Return on Investment: No differentiation is made by owner-operators between their regular share as a crew member and the boat's share of the total receipts. Very little absentee-ownership exists among small trawler propietors. The small otter trawler is not in great demand and many of the present owners intend to use the boats until they qualify for Social Security benefits.

Available Financing: Limited commercial bank financing is used. Dock operators, net and gear suppliers, and others extend short-term credit for materials and supplies. Bank financing is used only in cases where a boat is to be replaced or renovated to a major extent.

MEDIUM-SIZED OTTER-TRAWL FLEET: The construction of the larger inshore fleet of 40- to 49-foot vessels was greatly accelerated in the postwar years

of 1946 to 1949. Most of the craft were built in Virginia boatyards. One of the most popular models is a Chesapeake "vee" bottom about 42' x 12' x 4-6'. The deck plan is that of a forecastel with a pilothouse fitted into it and a large fish hold aft. The engineroom is located below the pilothouse and forward of the hold. The most common power plant is a rebuilt Diesel of about 165 hp. The mast, booms, rigging, and two-drum winch are located aft of the pilothouse. Offshore-style gallows are not in general use. A welded towing boom of 4-inch pipe is fitted with a double towing block. Electronic gear includes a radiotelephone, loran, and echo-sounder. Otter-trawlers of this class are manned by two men.

Fishing Gear: It is aboard medium draggers that the use of both flatfish and roung fish nets is most extensive. The term "round fish" includes such varieties as sea bass, sea trout or weakfish, and scup or porgy.

The change-over from one type of fishing to another is relatively simple and little fishing time is lost. This limited flexibility actually extends the working year by enabling vessel operators to take advantage of seasonal runs of round fish. As with other types of fishing, it is quite important for inshore trawler fishermen to be able to work as much of the year as possible.

Table 6 - Average Receipts, Expenditures, and Net Returns for Four Selected Medium (40-49 feet) Inshore Otter Trawlers Fishing for Fluke in 1957

	....($)....	
Average total receipts per vessel		7,055
Expenditures (average per vessel):		
Maintenance and repairs	467	
Other operating expenses:		
Diesel and lube oils, ice, grease, etc.	1,032	
Subsistence at sea for crew	253	
Stevedoring and casual labor	77	
Fishing supplies of a nondepreciable nature	49	
Fixed charges:		
Insurance	185	
Depreciation	1,002	
Fishing licenses and business taxes	74	
Crew shares	1,110	
Total expenditures and outlay (average per vessel)	4,249	
Net profit from 1957 fishing operations		2,806

Fishing Operations: A combined 1957 operational statement for four of the medium-sized trawlers is shown in table 6. The actual fishing season extends from May to October or later.

The average gross receipts or gross stock for the sample vessels was more than double that of the smaller boats. The larger craft are better equipped with modern fish-finding aids, efficient deck gear, and better power plants, and are manned by younger fishermen.

The larger size of hulls, the complexity of electronic equipment, and the intensity of fishing effort contribute to the high maintenance costs of the vessels. The pressure to "make do" or repair one's own equipment is not as strong here as it is aboard the smaller boats. Many of the 40- to 49-foot draggers are now approaching ten or more years of age. The costs of upkeep tend to increase with age as the accumulated ravages of wear and tear must be rectified.

Daily operating expenses reflect the differences in fishing intensity between the medium and small craft. The size and seaworthiness of the medium craft make it possible to fish in less than optimum weather. These newer draggers may be used to better advantage in the round-fish seasons when larger fish-hold capacity becomes important. Fishing for round fish requires that the net be towed at a faster

rate of speed; thus more fuel is burned per daily trip. In addition, the 40- to 49-foot trawlers are equipped with more powerful engines which consume more fuel per hour.

On the basis of an average 30-week fishing season, crew shares were not large in 1957. Not all shares are included in this amount, however. The initial cost of many of the postwar replacement vessels was such that family or other partnerships were formed and have been continued. Partners' shares are deducted from the net earnings of the vessel and are not reported as wages.

Capital Investment: The owners of the medium inshore vessels follow the same general accounting practices as previously outlined for small-boat operators.

Two of the medium vessels used in this study were built in 1947, the newest vessel in 1954 and the oldest in 1934. Only the latter hull has been fully depreciated. The amount listed for engine investment for fishing vessel #4 is somewhat inflated. Due to the need for engine replacement and simultaneous refinancing, the owners were forced to purchase a new power plant. The usual practice is to buy a rebuilt, surplus Diesel for about $3,000. The cost of the engine for fishing vessel #6 has been included in the hull investment figure.

Table 7 - Capital Investment in Four Selected Medium (40-49 feet) Inshore Otter Trawlers Fishing for Fluke in 1957

Depreciable Item	Fishing Vessel				
	#4	#5	#6	#7	
Hull	$4,000	$6,287	$ 8,200	$ -	
Engine	9,280	-	-	2,800	
Electronic gear	346	-	-	-	
Equipment	2,310	-	1,928	499	
Business auto	400	1,800	1,040	-	
Fishing gear	3,660	-	1,030	-	
Improvements	1,765	1,490	1,260	350	
Office and storage	-	-	-	1,050	
Total	$21,761	$9,577	$13,458	$4,699	
Average total investment per vessel					$12,374

Only the newest vessel lists electronic gear as a depreciable item. The others are equipped with this gear but it had been fully depreciated. The average equipment investment for the medium-sized trawlers was three times as much as that for the small-boat fleet.

Business automobile depreciation charges are made in the same manner as described earlier.

The fishing-gear investment for fishing vessel #4 reflects the degree of modernization and experimentation conducted by the partners of this vessel. Financial difficulties have forced them to attempt a large-scale "come back" in order to survive as independent operators in the fishing industry. With the very best of luck, however, it will take several years for them to firmly re-establish themselves.

It is interesting to note that 3 of the 4 medium vessels listed no investment in office or storage facilities. One explanation for this lies in the fact that the more efficient craft are tied economically to the dock from which they work and vice versa. The docks provide the necessary storage space and make available many other accommodations for their fishing fleets.

Return on Investment: Many of the difficulties inherent in the small-boat analysis are also present in the analysis of the newer medium inshore trawlers. The number of partnerships is large. The captain-operator's share and, in many cases, his fishing-investing partner's share are included in the net earnings of the vessel.

An active fisherman thinks of his boat as a tool for earning his living. There is some awareness of the fact that a given investment should provide a reasonable rate of return, but this is a secondary consideration.

As in the case of the smaller draggers, no serious attempt is made to set aside a reserve for depreciation. From an investment viewpoint, fishermen are faced with the same dilemma as are other small businessmen. The replacement costs of all gear and equipment items are rising; even with a depreciation reserve, the amount so ear-marked would be inadequate.

Available Financing: The better earnings, the larger investment, and the relative youth of the fishermen on the medium vessels make their owners better credit risks and thus more eligible for commercial bank credit. The credit worthiness of the individual owner is the decisive factor. Some operators must rely upon traditional credit sources such as suppliers and docks.

OFFSHORE FLUKE OTTER TRAWLERS

LARGE-SIZED VESSEL FLEET: The offshore and inshore fleets are hardly comparable. The fishing seasons are complementary: inshore, May to October; offshore, October to May. Many of the inshore vessels work almost exclusively on fluke; offshore craft seldom do.

Fishing Grounds: Inshore vessels depend upon sloughs and deeper areas of coastal waters inside the 15-fathom contour which extends 20 to 30 miles from shore. Offshore vessels normally begin fall operations somewhere between the 10- and 15-fathom line and shift gradually offshore as the season progresses, finishing the winter on the edge of the continental shelf. The area of most intensive offshore fishing effort is situated between 30 and 60 miles southeast of Delaware Bay in an area covering 1,500 square miles.

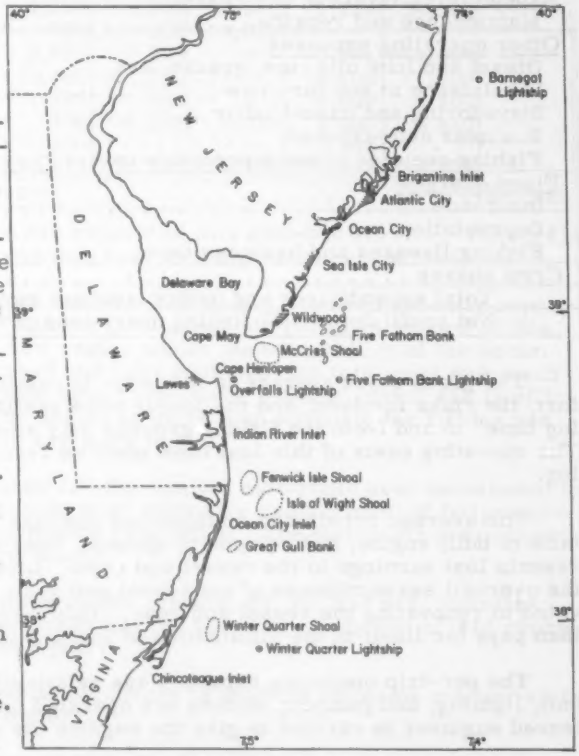

Fig. 4 - Chart of fishing ports and grounds near New Jersey.

Vessels and Equipment: Offshore vessels range in length from 55 to about 100 feet. Vessels in the 60- to 70-foot class are the most numerous and seem adequate for the hard use to which they are subjected. Offshore vessels utilize marine Diesels in the 170- to 500-horsepower range. The crew of 4 to 6 men includes the captain. All of the deck gear, rigging, nets, and equipment are of heavy construction. The peak of the offshore season occurs during the winter months; the wear and tear on all equipment is heavy.

Fishing Gear: The basic otter-trawl net used is similar to that used for round fish by the medium vessels, but the twine is heavier, larger otter boards are used, and wooden rollers are employed on the bottom edge of the net.

Owners of offshore vessels attempt to keep them in operation throughout the year. However, during the years 1946-53 an estimated 90 percent of the fluke

landings of the large otter trawlers were made in the October to May period of each year (June and Reintjes 1957). The situation has not changed substantially since then. Off-season types of fishing include trawling for lobsters and dredging for sea scallops. These supplementary operations are necessary in that they pay their share of fixed annual costs and tend to keep the fishing crew intact and employed. Despite the advantages of 12-months fishing operations, many of the offshore craft remain idle during the summer season. Engines, hull, fishing gear, and equipment are overhauled thoroughly.

Fishing Operations: A combined 1957 operational statement for five offshore large trawlers is presented in table 8.

Table 8 - Average Receipts, Expenditures, and Net Returns for Five Selected Large (over 49 feet) Offshore Otter Trawlers Fishing for Fluke in 1957

Average total receipts per vessel		$35,787
Expenditures (average per vessel):		
Maintenance and repairs	3,019	
Other operating expenses:		
Diesel and lube oils, ice, grease, etc.	7,890	
Subsistence at sea for crew	1,180	
Stevedoring and casual labor	369	
Business auto expense	86	
Fishing supplies of nondepreciable nature	352	
Fixed charges:		
Insurance	1,702	
Depreciation	2,933	
Fishing licenses and business taxes	269	
Crew shares	12,022	
Total expenditures and outlay (average per vessel)	29,822	
Net profit from 1957 fishing operations per vessel		5,965

The gross stock average is not large in relation to the intensity of fishing effort, the risks involved, and the longer trips lasting a week or more. The "steaming time" to and from the fishing grounds may amount to 12 to 24 hours or more. The operating costs of this lost time must be recovered from the few days of fishing.

The average repair and maintenance charges indicate the attention paid to details of hull, engine, and equipment upkeep. Lost time on the fishing grounds represents lost earnings to the vessel and crew. Lives and investment depend upon the over-all seaworthiness of the vessel and gear. A month in early summer is devoted to renovating the vessel and gear. This investment of time and money more than pays for itself in the elimination of lost fishing time.

The per-trip operating expenses are relatively high. The main propulsion unit, lighting, and pumping motors are operated on a continuous basis. An experienced engineer is carried to give the engines the constant maintenance required.

Stevedoring and casual labor charges are encountered when a trip is landed in other than the vessel's home port. The business automobile charge represents a prorated share of such costs incurred by the owner while on vessel business in port. The fishing supplies cost covers nondepreciable items.

Average insurance costs include those for the vessel and her crew. The risk of accident is always present in the offshore fishery. Insurance rates are high enough to work as an effective limitation on the amount of coverage purchased.

Average depreciation charges indicate the large investment required in the offshore fishery.

The business taxes charge includes the vessel's share of the crew's Social Security taxes and other incidental taxes.

The crew-share earnings are calculated for division among three men with a per-man average of about $4,000. The fishing captain is normally an owner or partner and his share is deducted from the vessel's net earnings.

Capital Investment: The hull investment for fishing vessel #8 is low in relation to the other trawlers because it was built in a low-cost area of Virginia. The cost

Table 9 - Capital Investment in Five Selected Large (over 49 feet) Offshore Otter Trawlers Fishing for Fluke in 1957

Depreciable Item	Fishing Vessel					
	#8	#9	#10	#11	#12	
Hull	$ 8,500	$15,300	$14,000	$13,570	$31,000	
Engine	4,000	3,200	13,300	7,220	24,389	
Electronic gear	350	362	1,025	-	-	
Equipment	3,585	2,887	-	2,301	1,800	
Business auto	1,425	1,750	-	2,100	1,000	
Fishing gear	1,397	933	-	2,800	3,500	
Improvements	500	1,508	5,860	1,600	4,650	
Office and storage	1,200	-	-	100	-	
Total	$20,957	$25,940	$34,185	$29,691	$66,339	
Average total investment per vessel						$35,422

of hulls #9, #10, and #11 are typical for vessels of this size and service. Vessel #12 is larger, over 100 feet in length, and was built in a high-cost period, 1943.

Rebuilt Diesels power vessels #8 and #9. Vessel #10 has been recently repowered with a new, heavy duty Diesel and the production and earnings record of this vessel after the installation of the new engine shows the advisability of the action taken. Vessel #11 was purchased used and fully equipped; the total cost was much less than if the vessel had been bought new. The power plant of vessel #12 is officially rated at 500 horsepower. The engine is more than adequate for fishing use but operating and maintenance costs are quite high.

Recent loran installations account for the similar electronic gear investment in vessels #8 and #9. Vessel #10 has undergone extensive replacement of fully-depreciated items as part of an almost complete renovation. The electronic gear aboard vessels #11 and #12 is totally depreciated.

The equipment investment in three of the vessels, #8, #9, and #11, indicates shifts to other types of fishing; that of #10 has not been replaced; that of #12 represents major repairs to damaged deck gear.

The business automobile depreciation charge is made in the same manner as the comparable charge by small-boat owners.

The fishing gear investments in vessels #8, #9, and #11 are indicative of changes in operations. The sizable gear investment in vessel #12 represents the replacement of lost and damaged gear.

The newness of vessel #8 has meant that no large-scale improvements were necessary. The improvements listed for vessel #9 and #11 are nominal and were probably made to compensate for normal wear and tear. Vessel #10 and #12 have undergone extensive overhauling.

Office and storage depreciation charges are not shown for 3 of the vessels; one other lists a nominal charge. The remaining vessel's depreciation charge is made

because of the type of operation conducted by the owner. The latter vessel shifts from dock to dock according to the operator's estimate of where he can receive the largest price for his landings. This degree of independence exacts its toll in that private storage and office facilities must be maintained. The owner is of the opinion that the additional investment and maintenance costs are offset by the higher prices received and that he actually earns an annual profit on his extra investment.

Return on Investment: It is assumed that the captain's share amounts to no more than his regular crew share of $4,000. This would provide a remainder of $1,965, presumably the net return on investment. On an average investment of $35,422 the rate of return would be calculated at about 5 percent. The risk nature of the investment, the ever-increasing costs of replacement, and the more attractive, less uncertain return offered by alternatives are factors which render this rate of return rather low by comparison with other investment opportunities.

Available Financing: The owners of offshore vessels are required to make a substantial initial investment. The sale of a previously-owned vessel or other equity provides the down payment. Bank financing is extended to buyers having good credit standing. However, when bankers are unwilling or unable to finance the purchase, the seller may be of assistance by accepting a vessel mortgage on the unpaid balance. The term of these mortgages is 3 to 5 years. During the period of repayment, the new owner must carry full vessel insurance. The costs of insurance and interest are deducted from the boat share which totals 35 to 40 percent of the gross stock. The interest and insurance costs are legitimate business expenses, chargeable against the business activities of the year in which paid. Mortgage payments are not expense items for tax purposes. The total purchase price, less salvage value, is listed on the depreciation schedule for the year in which the hull, engines, and equipment were bought. The total depreciation amount chargeable is often less than the actual mortgage payments. This method of accounting works a hardship on the purchaser. Operations must be intensive to meet the added expense of interest and insurance, mortgage payments, and other incidental added costs. The larger gross stock which accompanies such intensity normally results in a greater net profit; this in turn leads to a large income-tax liability.

The 35 to 40 percent boat share is set aside in a regular bank checking account. Maintenance and other costs are paid out of this account. It also provides a source of capital for future business expansion.

Usual credit sources such as suppliers and ship chandlers, dock operators, and others are open to offshore fishermen. These forms of credit are usually of short term and are on a more or less informal basis.

New Credit Source: The recently-created Federal Fisheries Loan Fund will probably be of greatest importance to the offshore fleet. Profit records, the amount of owner equity, and other considerations seem to enhance the credit standing and eligibility of this group.

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1957. Survey of the Ocean Fisheries off Delaware Bay. U. S. Fish and Wildlife Service, Special Scientific Report--Fisheries No. 222, 55 pp.

A REPORT TO THE SHELLFISH INDUSTRY[1/]

By Arnie J. Suomela*

THE PARTNERSHIP APPROACH

To me, the most significant characteristic of activities of the recent past in the shellfish field has been the fine teamwork which has been displayed. The partnership approach has appeared repeatedly and it has embraced all parties--Federal and state governments, private agencies and industry. In viewing the reports from our personnel, upon which I am basing my remarks, I constantly found mention of cooperative action. That's a very healthy sign and it promises well for the future.

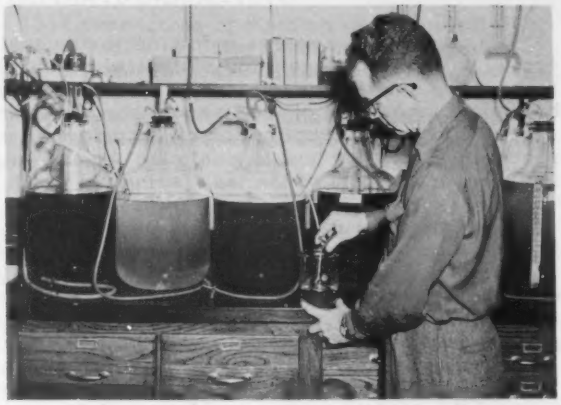

Fig. 1 - At Milford, Conn., food for larval oysters and clams is grown in warm water supplied with nutrients and fluorescent light.

I think this kind of an attack on problems of joint interest is something of a tribute to my immediate boss--Assistant Secretary for Fish and Wildlife Ross Leffler--for he's been preaching this theme continuously. It must be clear to everybody now that he really meant it when he said Fish and Wildlife Service people were going to operate on a partnership basis because all the jobs before us demanded a joint effort by all our agencies with the full force of the combined trained manpower available. There are no solo performances in an effective attack like the one which is now being mounted.

Perhaps one of the best examples of what I'm citing is the partnership program set up by the memorandum of understanding between the Fish and Wildlife Service, the Food and Drug Administration, and the Oyster Institute last December 12. This program is better known as GICORP--standing for Government-Industry Cooperative Oyster Research Project. Its objectives are to study characteristics of oysters from areas of the Chesapeake Bay and other areas unanimously agreed upon in the future, from the time of harvesting through to final destination. This is being done to accumulate data as a basis for evaluating, and possibly amending, the definitions and standards of identity for raw oysters, thereby insuring practical, enforceable standards which will protect the consuming public.

The first step was the establishment of a research team from each of the participating groups, headed by a Director empowered to organize and guide research under the new program. The first report of the results of the GICORP studies was given by the technical committee and the Director on May 25.

PROMOTIONAL PROGRAM

Another development recently on the marketing side of the ledger which I am certain is of interest to you relates to a new promotional effort of the U. S. Bureau of Commercial Fisheries to stimulate the public use of all fisheries products. Using Saltonstall-Kennedy Act moneys, the Bureau has awarded a contract to a film

1/ From an address delivered by the author at the Joint Convention of the Oyster Institute of North America and National Shellfisheries Association, Washington, D. C., July 27, 1959.

* Commissioner, Fish and Wildlife Service, U. S. Department of the Interior.

company to produce four basic public service promotional TV presentations which are subdivided into three shorts, each 10 and 20 seconds and 1 minute in length.

They are ultramodern animated cartoon-type presentations especially designed to awaken public interest in the use of fish and shellfish for healthy, wholesome meals on the family table. The first of these is scheduled to appear at the time of National Fish Parade, October 19-25, 1959.

OYSTER AND STARFISH RESEARCH

I know it's not necessary for me to emphasize here the importance of being armed with the findings from biological research in order to improve the management of the shellfishery resource. You recognize full well that only through better biological knowledge of the fish and shellfish resources can we initiate the steps required to get full application of the principle of maximum-sustained yield of such products. Learning how to minimize the limiting factors which plague the resource is an important part of the task facing us.

Two major problem areas continue to exist in the oyster industry. Our approach in both cases employs the close teamwork principle. One problem centers in Delaware Bay where extensive oyster mortalities have occurred and oyster production has reached an extremely low level. The other is in Long Island Sound where starfish continue to be extremely abundant and their predations have caused great losses of seed and adult oysters.

DELAWARE BAY PROBLEM: The U. S. Fish and Wildlife Service has been aware of the serious oyster problem in Delaware Bay for some time, and has taken a number of steps to assist the industry.

First, we have allocated funds to Rutgers University to expand their State-financed research into the cause of the oyster mortality in Delaware Bay. A contract with Rutgers was begun in the spring of 1958 and has been continued and expanded since that time.

Secondly, we have reoriented our oyster research at Franklin City, Va., so that more time of our biologists is being devoted to the oyster-mortality problem in that area.

Third, we have brought expert oyster pathologists, including Dr. Sammy Ray from the Gulf of Mexico, and Dr. Reed Logie from Canada, to the Delaware Bay area for consultations regarding the causes of this mortality and the steps which might be taken to alleviate this situation.

Fourth, we have included an item of $47,000 in our fiscal year 1960 budget for the beginning of a long-range investigation of the causes of this and similar shellfish mortalities. In planning this program we have stressed the difficulty of this problem by comparing it to medical research on human diseases. In fact we have stated from the beginning that this investigation may require at least ten years.

Fifth, we expect to work cooperatively with each of the states involved in this problem to get the most for our research dollar and to reach a solution to this problem as rapidly as possible.

In addition to all this, the Service soon will have improved laboratory facilities in the Chesapeake area to permit expanded and more effective shellfish research by our personnel there. As a matter of fact, bids for the construction contract for the new laboratory at Oxford, Talbot County, on the eastern shore of the Chesapeake Bay in Maryland have been awarded.

This new site is in the center of the oyster-culture region and the salinity is high enough to permit us to run laboratory experiments in oyster culture which are not now possible in our present laboratory facilities. There are also few or no shellfish predators at this location.

STARFISH PREDATION: The starfish problem in Long Island Sound continues to be extremely important and here also the U. S. Fish and Wildlife Service is taking action in cooperation with the states to assist the industry.

When it became apparent that the 1957 year-class of starfish was unusually great, the first action by the Service was to call a meeting of the industry, state, conservation departments, and biologists to explore possibilities of assisting the industry. It appeared from these discussions that several problems were involved in the oyster crisis in the Long Island Sound area. Several storms had destroyed many oysters on the beds. Reproduction had been unsuccessful for a number of years. Oysters drills were numerous and caused heavy losses. And as a final straw, hordes of starfish appeared on the beds.

As a result of these meetings the second action by the Service was to increase the research fund of the Milford Laboratory by $64,000 to attempt to find answers to these problems. Considerable progress has been made in these studies.

Third, the Service is cooperating with the States of New York and Connecticut in a joint program to determine the effectiveness of the present known methods of starfish control and to try to develop improvements in these methods. The research funds of the Milford, Conn., laboratory have been increased by $20,000 to permit our participation in this program.

Fourth, we plan to continue the research program at Milford, Conn., to explore the possibility of new and improved methods for control of starfish and other oyster predators. We are particularly encouraged by the recent progress of this work, some of which has been reported upon.

OTHER SHELLFISH RESEARCH

The shellfish culture studies by the Milford staff are also continuing, aimed at the development of improved hatchery techniques, including means of providing preserved larval foods for oyster and clam hatcheries. Reports have been presented on the growth of some of the Connecticut laboratory-produced seed clams in Florida waters and investigations into the effects of turbidity on clam-egg development and clam-larvae growth.

Members of the Boothbay Harbor, Maine, laboratory staff are dealing with the clam predator problem involving green crab control. Barriers of trawl lines of chemically-treated fish baits are being field-tested by our personnel and by personnel of the Maine Department of Sea and Shore Fisheries.

Down at the Gulf Breeze laboratory in Florida, our scientists are also at work on important oyster research. They are exploring various possibilities of biological control of oyster enemies, employing parasites. They are also involved in basic research into the reactions of oysters to various factors in environment. In this investigation, they are working on an island situation where on one side there is fast oyster growth and on the other side slow growth.

I should also mention the research of the U. S. Bureau of Commercial Fisheries Beaufort Laboratory in North Carolina. For the past nine years, research has been carried on with the cooperation of the Atomic Energy Commission, looking into the accumulation of radioactivity by fish and shellfish from atomic explosions and other use of atomic energy. The purpose is to determine concentration factors

and rates of accumulation of radioactivity for various levels of pollution in order to determine adequate health standards. Although the A. E. C. support is to be decreased, the Bureau plans to continue and expand the studies.

Definitely, we are missing no bets as we expand our shellfish research programs. During the past year the Service sent two shellfish biologists to foreign countries to observe the progress in shellfish research there in order to determine if methods or techniques in use in those countries could be applied to increase the effectiveness of our research programs.

At Woods Hole Dr. Paul S. Galtsoff continues work on his book on "The American Oyster." This extensive compilation of our knowledge of the oyster is well along on its path to publication. Six chapters have been written and are now being reviewed. Other chapters are nearing completion and we look forward to publishing this valuable work in the near future.

This matter of publications is vitally important in the field of scientific investigation. Our personnel give it constant attention so that their coworkers in other agencies have the benefit of their findings at the earliest possible moment. During the past year alone, there have been a total of 21 papers published by the Service on shellfish studies alone. This good reporting rate reflects the high quality of our shellfish research effort.

A LOOK TO THE FUTURE

And now--let's look at the future. I have to say frankly that we do not have an easy path to follow. We're confronted by some difficult problems--especially the troubles caused by an excess of starfish and the as yet somewhat mysterious cause for oyster mortality which has crept into some of our important production areas.

These are problems which we're confident can be solved, but all research takes time. It can be speeded only when we achieve a maximum of efficient effort through well-coordinated, all-out cooperation.

Our field people have been particularly encouraged by the outstanding assistance they have received from the Long Island industry in the fight on the starfish problem. It has been so significant that it deserves a pat on the back.

I also want to pass along to you the conviction of our field men that they see similar help forthcoming from the industry elsewhere as the attack on the mortality problem becomes better understood and the opportunities to assist are more clearly recognized.

Working together, we're finding out the ways to make real progress on these problems of mutual concern. Following such a pattern, we are bound to attain our goal--methods of control of factors curtailing shellfish production so that excessive losses may be limited and a more stable industry assured.

I want to conclude with this thought: there is no substitute for the products of laboratory efforts. Progress in all industries is carved out painstakingly when you nurture basic and applied research. In this respect our shellfish work is setting a good example for other fisheries investigations.

And remember this--it makes no difference where we do the research as long as it's done, for the findings can be applied to help you wherever there is a similar problem.

SODIUM CONTENT OF FISH

Is fish suitable for low-sodium diets: A chemist of the U. S. Bureau of Commercial Fisheries, Seattle, Wash., presented the following information on the sodium content of fish meat at the 42nd Annual Meeting of the American Dietetics Association in Los Angeles, Calif., on August 27, 1959.

Foods, to be acceptable for use in low-sodium diets, should contain considerably less than 0.1 grams of sodium per 100 grams of food, since some menus restrict the maximum daily intake of sodium to 100 milligrams. The majority of meat foods--including red meat, poultry, fowl, fresh-water fish, and salt-water fish--have values well below this limit.

Practically all fresh-water fish have a sodium content of 40 to 80 milligrams per 100 grams of meat with a general average of 59. The same average is found for most species of salt-water fish, and the range is about the same also. Their sodium content is usually lower than most fresh-water species.

Such factors as species, size, sex, and season of capture contribute to a wide variation in the sodium content of fish meat. But, the variations are not sufficiently large to prevent the use of fish meat in sodium-restricted diets.

Canned fish is usually salted to suit the average taste. This product has a sodium content of 600 to 800 milligrams per 100 grams. But the unsalted canned product is found to have practically the same sodium content as is found in fresh fish. The so-called "dietetic pack" may, therefore, be produced from all species commonly used for canning.

Although many factors contribute to variation in sodium content of fish meat, the values usually lie within the range of 40 to 80 milligrams per 100 grams, unless sodium has actually been added. Since large quantities of practically all species of fish are readily available that have not had sodium added, fish can be used in sodium-restricted diets to provide interest and variety.

STANDARD FOR FROZEN SALMON STEAKS

In the development of voluntary standards for fishery products, the U. S. Bureau of Commercial Fisheries technological group maintains an active liaison with its inspection and certification group. The standard that is developed and the inspection procedures therein must be practical from the inspector's standpoint and still realistically reflect the quality level of the product.

The laboratory work on a standard for frozen salmon sticks is essentially complete. It is likely that this standard will be in effect by the beginning of 1960.

After the completion of the written standard, the Bureau customarily carries out a grading survey to test the applicability of the standard. Based on the examination of 391 sample units (249 retail size units and 142 institutional size units) taken from processors' warehouses the following findings were noted:

(1) The average point score for the retail size units was 82 points, and for the institutional-size units 88 points. These data indicated that the quality of the institutional size pack was significantly better than the retail-size pack.

(2) The principal factor contributing to the Grade "B" and "Substandard" classification was flavor, primarily rancidity of the fatty portion.

(3) The percentage glaze, free drip, and cook drip were not considered as factors of quality in grading of the frozen salmon steaks inasmuch as meaningful relationships could not be established.

An example of the close liaison maintained between the standards development and product inspection groups is demonstrated by the following:

The control of net package weights was found to be a serious problem in this survey. Our inspection personnel in following up on this problem during routine checking of net weight noted that the glaze water used in glazing salmon steaks was occasionally at some elevated temperature at the start of the steaking operation. As the steaking progressed, the temperature of the glaze water was continuously lowered until equilibrium temperature was attained. Adjustment for glaze pickup to meet net weight requirements if based on the initially warmer glaze water, resulted in underweights as the glaze water temperature dropped, due to the greater pickup of glaze at these lower temperatures. Thus, in order to control the percentage of glaze and thereby glaze allowance and net weight the inspector found it necessary to routinely check glaze water temperature in order to protect the processor against excessive overweights or underweights.

VALUE OF FISH-BODY OIL IN REDUCING CHOLESTEROL LEVELS

Relief for persons with high cholesterol levels in blood serum is indicated by oil research projects now under way. The findings are the result of a series of research projects on fish-body oil conducted by the U. S. Bureau of Commercial Fisheries Technological Laboratories and by the Hormel Institute of the University of Minnesota under a Bureau contract.

Bureau officials hope that their efforts will encourage clinical testing by responsible medical research staffs to evaluate the results obtained to date and to further explore the application of these results to conditions which may cause or aggravate atherosclerosis and kindred diseases. Bureau officials further state that the research has opened the way for the development of a food supplement composed of those fractions of fish oil which are the most effective in lowering the blood cholesterol level.

These discoveries were incidental to a Bureau basic research program to "take fish oil apart, molecule by molecule, and see just what it contains." Once the unique blood cholesterol depressent effects of fish oils were noted, research programs were inaugurated to explore them. Technicians state that there is still considerable basic research needed to fully explore the properties of fish oils.

The key findings of the research are (1) the abundance of what is known as "unsaturated" fatty acids in the body oils of many species of fish, and (2) proof that the

feeding of these "unsaturated" fatty acids to test animals reduced the cholesterol levels in direct proportion to the degree of unsaturation.

The term "unsaturated" in this instance applies to those fats in which there are carbon atoms which have not combined to the fullest possible extent and which are capable of uniting with certain elements or compounds to change the character of the fat.

A "saturated" fat, such as lard, congeals at low temperatures. An "unsaturated" fat does not congeal readily. This is the property which permits fish to move freely in waters of low temperatures.

Bureau research has shown that about half of the body oil of most species of fish is unsaturated and about 10 percent of it is highly unsaturated. This latter portion of the fish oil contains 5 or 6 unsaturated carbon atoms per "chain," compared with only two such atoms in vegetable oil. In other words the potential of fish oil in reducing the cholesterol level is approximately three times that of vegetable oils.

Second only to the Bureau findings that unsaturated fish oils readily reduce the blood cholesterol levels is the development of a method to separate the highly unsaturated 10 percent from the rest of the oil. It is this method which makes it possible to utilize only the essential part of fish oil in reducing cholesterol levels. Thus the patient would take only one-tenth of the calories contained in the whole oil.

The process of separating the unsaturated fatty acids from the rest of the oil requires some very definite conditions to maintain the value of the product and avoid possible toxicity, Bureau officials state, adding that this is another reason why the findings should be clinically tested.

Among the fish which have liberal amounts of body oils are salmon, mullet, mackerel, and herring. Menhaden is not now used as food fish but it yields considerable amounts of highly unsaturated oils.

COOKIES MADE FROM ALGAE

Cookies can be made from algae, the green scum that floats on ponds, Edith Katherine Schuele, a 15-year-old Memphis, Tenn., high school junior told the annual meeting here of the American Medical Association at Atlantic City, N. J.

Edith, who won the top AMA award at the National Science Fair in Hartford, Conn., in May, displayed at the meeting cookies, cinnamon pinwheels, French bread and cheese swirls that she made from algae.

The use of algae in foods, she said, increased the protein content 20 percent and the fat content 75 percent.

Edith said she grew the algae, spun it in a centrifuge, and heated it to obtain a powder. It tastes like broccoli, she noted.

Currently algae is being considered as a food that could be grown aboard rocket ships for space crews on their trips. One tablespoon of algae equals the nutritional value of one ounce of steak. (Food Field Reporter, July 20, 1959.)

TRENDS AND DEVELOPMENTS

Fishing Vessel and Gear Developments

EQUIPMENT NOTE NO. 2--
PACIFIC COAST DRUM TRAWLING:

Drum trawling, a relatively recent development, was introduced into the Pacific Northwest otter-trawl fishery in 1954 (Alverson 1959) following the development of drum purse-seining. The drum-trawling method can be adapted readily to the trawling system in conventional use on the Pacific coast, wherein the net is towed from davits located one on each quarter of the stern. No major modifications in net rigging are necessary to convert the trawl to the drum method. Patents covering some aspects of drum trawling have been applied for by the designers.

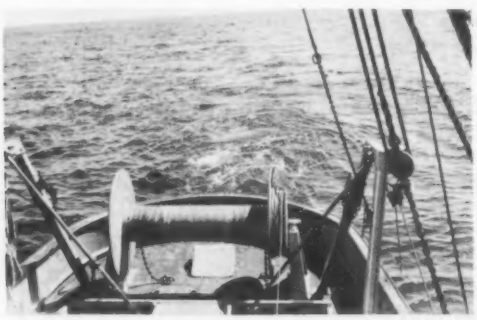

Fig. 1 - Otter trawl drum. The drive reel is on the port end of the drum. The drive wire, extending forward, leads to the winch drum.

The principal unit of the system is the drum upon which the trawl is wound (fig. 1). It is constructed of sheet steel and is designed to accommodate a conventional otter trawl. Drum flanges are 4 to 5 feet in diameter and the drum core is 15 to 20 inches in diameter and 5 to 8 feet long. Stopper chains, for securing the trawl to the drum, are fastened near each end of the core (fig. 2). The drum is powered either directly by an independent hydraulic or mechanical drive similar to that described for drum seiners (Smith 1954), or indirectly by means of a wire rope running from the main winch drum to a drive reel on the side of the trawl drum (fig. 3).

Fig. 2 - Stopper chain. A six- to seven-foot stopper chain is secured near each end of the core of the trawl drum. A snap is secured to the other end of the chain to receive the bridle.

Two methods are employed commonly for connecting the net to the doors in the Pacific Coast trawl fishery: (1) wires leading from the headrope and footrope of each side of the trawl are connected directly and separately to the doors

Fig. 3 - Setting the trawl. The drive wire, leading through the block in the foreground, is unwinding from the trawl winch onto the drum drive reel.

creating a net-door connection known locally as a "double dandyline;" or (2) the foreward end of the wire leading from the headrope is joined to the foreward end of the wire leading from the footrope of the same side to form a bridle, usually about 15 fathoms long, and the bridle is connected to the door by a 25-fathom single-wire section (ground wire) forming what is known locally as a "single dandyline." The chief difference between the use of double and single dandylines in drum trawling lies in the way in which the two are started onto the trawl drum: when a double dandyline connection is used, the trawl is started onto the drum at the wingtips; whereas when a single dandyline is used, the trawl is started onto the drum at the foreward end of the bridles. The following is a description of a trawl equipped with a single dandyline.

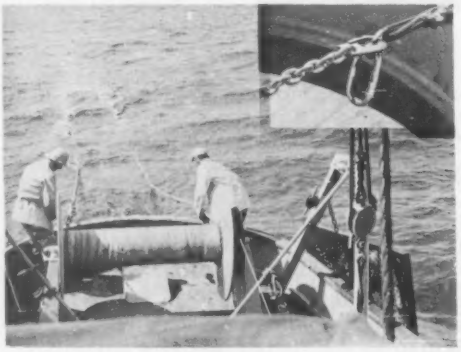

Fig. 4 - Drum stopper chains taking the strain of the gear. The trawl bridle can be seen leading to the net. The inset shows the snap at the end of the stopper chain connected to the end of the trawl bridle.

Setting the Gear: (1) The bag of the trawl is thrown overboard and the net unwinds from the trawl drum as the vessel moves ahead (fig. 3). (2) When the trawl and trawl bridle have been set the drum stopper chains support the strain of the gear (fig. 4). (3) At this time the dandylines are reeved through the towing blocks on the davits and secured to the ends of the trawl bridles (fig. 5); the strain is taken off the stopper chains with the winch, and the chains are disconnected. (4) Setting is then continued until the end of the dandyline is reached, the doors are hooked on in the conventional manner, and the set is completed by slacking out the required amount of warp.

Picking Up the Gear: (1) The doors are hauled back to the davits and, in contrast with conventional trawling methods (Knake 1958), are completely disconnect-

Fig. 5 - The dandyline (on the other side of the fisherman) has been reeved through the davit towing block and connected to the trawl bridle. When the dandyline receives the strain of the gear, the stopper chain will be disconnected. Note the G-hook at the end of the dandyline.

ed from the dandylines--this is facilitated by replacing the conventional "Kelly-eye" with a "G-hook." (2) The gear is hauled in until the foreward end of the trawl bridles appear. (3) The stopper chains are then connected. (4) The gear is slacked off slightly until the stopper chains take the strain of the trawl; and the dandylines are disconnected from the doors, removed from the trawling davits, and connected to the drum-drive wire. (5) The trawl is then started onto the drum (fig. 6). (6) When the trawl has

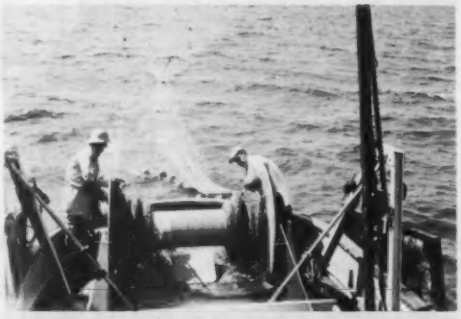

Fig. 6 - Winding the gear onto the drum. A "floater" of Pacific ocean perch can be seen in the background. The drive wire in the foreground is being wound from the drive drum onto the trawl winch.

been wound onto the drum as far as the intermediate trawl section, the portion of the trawl remaining in the water is lifted with a single-block lift, the fish bag is brought alongside by turning the vessel, and the splitting operation carried out in the usual way (figs. 7 and 8).

Fig. 7 - The fish bag alongside ready for splitting. Note how, after splitting, the intermediate trawl section and bag are wound directly onto the trawl drum without further handling or vessel maneuvering.

There are several advantages to drum trawling: the net can be handled much more rapidly and with less labor; the operation is safer because overhead handling of heavy gear is eliminated and

Fig. 8 - Splitting a 6,000-pound catch of Pacific ocean perch.

the amount of total handling required is reduced; the operation can be carried out more easily in rough seas; and the method helps prevent the partial escape of fish from the mouth of the trawl--a source of loss that is often serious with conventional methods of picking up the trawl.

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--By Fred Wathne, Fishery Methods and Equipment Specialist
Branch of Exploratory Fishing and Gear Research
Division of Industrial Research and Services, Seattle, Wash.

Note: Appreciation is extended to Capt. Louis Salveson of the drum trawler Guide for his cooperation in providing the opportunity to observe and photograph the drum-trawling technique.

Agriculture Yearbook Includes Story of Fish

Included in the recently issued U. S. Department of Agriculture Yearbook for 1959--Food--is the story of the U. S. Department of the Interior's activities relating to fish and the fishing industry.

The article is by A. W. Anderson, Assistant Director of the Bureau of Commercial Fisheries, Fish and Wildlife Service. It deals with the food aspects of fish--the food which is hunted, not farmed--and the activities of the Department of the Interior in behalf of the fishing industry and in the interest of the consuming public.

The value of fish as a food is pointed out--a well-balanced protein with good percentages of several essential vitamins and with "unsaturated" acids of apparently considerable value in lowering the cholesterol level in the blood serum.

The standards of quality for several fishery products and the inspection serv-

ice which assures quality fishery products are described as services available to those fishery processors who want to display the Department of Interior shield of quality on the goods they offer to the householder.

There is a "purchasing guide" which explains the terminology of fishery products in simple language and numerous items of interest to the housewife about fish and shellfish.

After the discussion of fish as a food comes information on the activities of the Bureau of Commercial Fisheries in behalf of the fishing industry and the consumer of fishery products. Concisely told is the story of fishery statistics compiled by the Bureau and the dissemination of market information by the Fishery Market News Service which puts buyer and seller on an even footing on facts about supply and demand.

In 1957, the annual harvest of about 5 million pounds was worth $351 million to the men on the boats; $592 million at the processing level; $836 million at wholesale level; and $1,091 million to the retailers.

A chart shows that United States production is relatively stable but that the imports are definitely increasing; another chart shows the United States in second position, far behind Japan, in fish production and just barely ahead of mainland China and the U. S. S. R.

The interesting story of fishery biological research is told. Included is a reference to the three-Nation effort which is being made to learn enough about salmon to set up salmon management plans for countries in two hemispheres. The job is complex, for salmon is a fish which has a definite "home" for short periods in America or Asia at hatching and spawning times but otherwise is voyaging several thousand miles of ocean.

There is the story of the sea lamprey, the huge king crab, and the minute oyster crab, common and uncommon fish and shellfish, fishing equipment problems, distribution problems, the value of fish meal in animal diets, and the value of fish oil in industry. There is material about exploratory fishing, gear research which helps the industry meet some of its technical and practical problems, and technological research which aims to make it possible for the consumer to get the best possible product.

In one place the article pays tribute to the United States fishing industry with "Our fishing industry is unusually independent. It prefers to pursue its own course with a minimum of governmental assistance or the exercise of Federal or State authority. There is no Federal legislation authorizing subsidies or price support or similar programs for fishery foods. The producers and consumers do benefit, however, from the research and similar services that the government provides for most industries."

American Fishery Advisory Committee

PROGRAMS AND PROBLEMS DISCUSSED AT 10TH MEETING:

The tenth meeting of the American Fisheries Advisory Committee was opened on October 7, 1959, at Old Point Comfort, Va. This advisory group was created under the terms of the Saltonstall-Kennedy Act of 1954 as amended in 1956. This legislation provides that an amount equal to 30 percent of the moneys received from import duties on fishery products shall be made available to the Secretary of the Interior to promote the free flow of domestically-produced fishery products in commerce by conducting a fishery educational service and fishery technological, biological, and related programs and to develop and increase markets for fishery products of domestic origin.

The meeting concentrated on fishery programs and problems of the Middle Atlantic and Chesapeake Bay areas. Discussing topics vital to the fisheries industry were representatives of the U. S. Bureau of Commercial Fisheries and Committee members.

Representatives of the Bureau pointed out that:

(1) In the Middle Atlantic and Chesapeake Bay area fish and shellfish valued at $61 million are landed annually--about 17 percent of the total value of all fish and shellfish landings in the Nation.

(2) There are two species of whiting potentially abundant in the Middle Atlantic area not now exploited.

(3) The three major problems of the oyster industry are the need for an increase in seed production; control of oyster predators; and the need to identify and control diseases of oysters.

(4) A method has been developed based upon the effectiveness of a chemically-treated barrier of sand to protect oyster beds.

(5) There has been progress reported on the team approach by the Government-Industry Cooperative Research Program to the problem of determining satisfactory definitions and standards of identity for raw oysters.

(6) The sudden and large fluctuations in the supply of blue crabs needs research attention and a shift of effort from the shad investigation to the study of blue crab problems is scheduled.

(7) In a report of progress in the processing of crab meat, it was revealed that tests proved that the boiling method of extracting crab meat yielded nearly nine percent more meat than did the steaming method. In terms of current production figures, this would provide an increase in gross value of crab meat of about $1 million annually.

(8) Various factors influence the important menhaden fishery--the effect of man-made changes in the estuarine nursery grounds, the make-up of menhaden populations, and the characteristics of the ocean environment that influence the behavior, distribution, and abundance of the fish; all these factors need to be studied.

(9) The need to insure the future market for fish meal by a complete knowledge of the nutritional value of the product and a study of new market possibilities.

(10) A chemical test has been developed for determining accurately the freshness of crab meat. This so-called picric acid turbidity test has been industry-tested successfully on shrimp. It reveals a departure from ideal freshness of the product even before changes in either the flavor or odor can be detected.

(11) The economics of the fish-oil industry point up the need for better methods of processing, new products, and exploitation of recent studies of fish-oil fatty acids and their derived products. Progress has been made in the analysis of fishy odors leading to practical application of those studies.

American Samoa

American Samoa Tuna Landings, January-September 1959

Species	September		January-September	
	1959	1958	1959	1958
	(1,000 Lbs.)			
Albacore	2,077	1,716	15,284	15,450
Yellowfin	322	313	3,430	4,185
Big-eyed	63	29	744	874
Skipjack	-	-	4	-
Total	2,462	2,058	19,462	20,509

Note: Most of these tuna were landed by Japanese vessels; a small amount by South Korean vessels.

Atlantic Estuarine Research Society Meets

The fall meeting of the Atlantic Estuarine Research Society, whose members are marine scientists from Massachusetts to Florida, met at Virginia Beach October 2-4, 1959, as guests of the Virginia Fisheries Laboratory.

Several fishery biologists of the Virginia Laboratory presented papers before the assembled scientists: (1) comparison on "condition indices" of oysters cultured in trays and those grown on natural bottoms; (2) the catch-rate changes in the salt-water sport fishery; (3) a review of the grey sea trout studies made in Virginia; and (4) Virginia's work on crab pot mesh size and its relation to catch.

A visiting shellfish biologist from the University College of North Wales pre-

sented a paper on the setting of barnacles.

This society, which is the only one in the United States devoted exclusively to the study of the problems of research in inshore marine waters along the Atlantic seaboard, meets in regular spring and fall session. Its membership consists of about 140 marine scientists.

California

PELAGIC FISH POPULATION SURVEY OFF COAST OF SOUTHERN AND CENTRAL CALIFORNIA CONTINUED:

M/V "Alaska" Cruise 59A6-Pelagic Fish: The coastal waters of central Baja California from Magdalena Bay to Cedros Island were surveyed (July 24-August 11, 1959), by the California Department of Fish and Game research vessel Alaska. The objectives were: (1) to sample young sardines for determining the relative abundance and distribution of fish resulting from the 1959 spawning; (2) to sample adult sardines, Pacific mackerel, jack mackerel, and anchovies; (3) to collect live sardines for genetic studies conducted by the U.S. Bureau of Commercial Fisheries Biological Laboratory at La Jolla; (4) to tag barracuda incidental to pelagic fish work; (5) to collect specimens as requested by other investigations; and (6) to troll for albacore while en route to Magdalena Bay.

Of the 68 light stations occupied, sardines were taken on 17, Pacific mackerel on 12, northern anchovies on 11, and jack mackerel on 6.

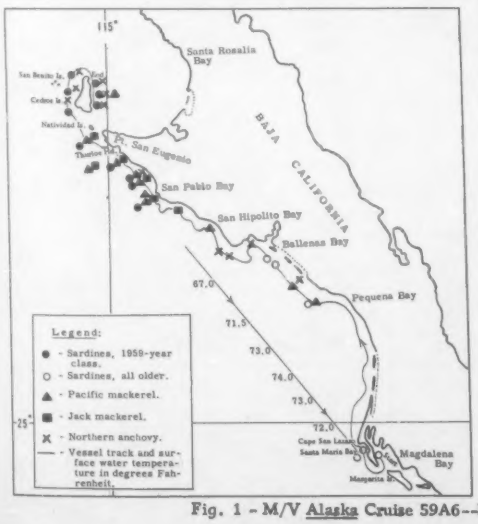


Fig. 2 - California Department of Fish Game's research vessel M/V Alaska.

Eleven of the 17 sardine samples were comprised of the 1959 year-class ranging in length from 80 to 115 mm. These fish were taken between San Pablo Bay and Cedros Island. Adult sardines were taken only in a small area between Ballenas and Pequena Bays. One sample of these fish produced a near running-ripe female which was the only female of a 50-fish sample. No live sardines were delivered to the Bureau's Laboratory at La Jolla due to insufficient quantities collected.

The Alaska scouted 396 miles and 44 pelagic fish schools were sighted. Of this total, 30 were identified as sardine, 6 as anchovy, and 8 were unidentified. Bioluminescence was adverse for good visual scouting during a large part of the cruise.

Fig. 1 - M/V Alaska Cruise 59A6--Pelagic Fish (July 24-August 11, 1959).

A total of 499 California barracuda was tagged with type "G" spaghetti tags at Asuncion Bay and Cedros Island. The fish were taken on barbless lures and held one day in the vessel's large live wells prior to tagging. All but 73 were released at Asuncion Bay.

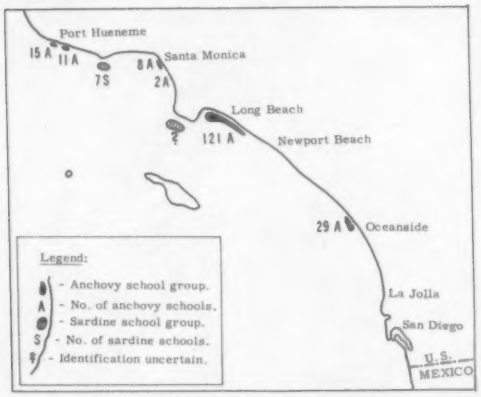
Live red crabs (Pleuroncodes planipes) requested by inland fisheries died before the vessel reached port. Specimens of marine organisms were collected for other investigations.

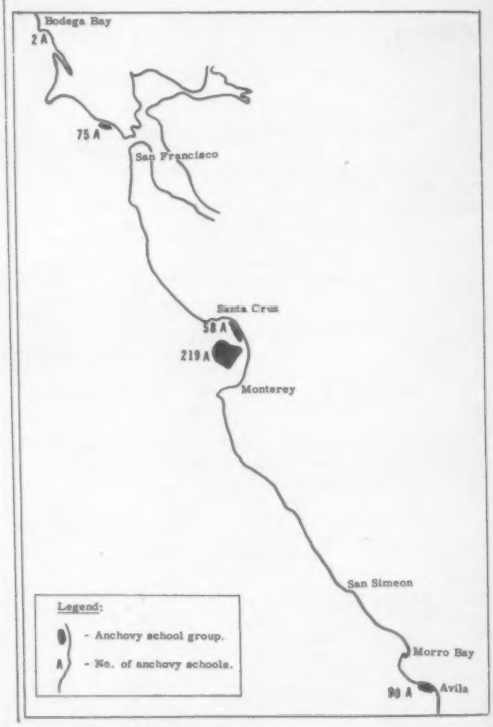
While en route from Ensenada to Magdalena Bay, a special offshore trolling track was followed to encompass previously productive albacore waters. No albacore were taken. Water temperatures were unfavorable for albacore.

Sea surface temperatures ranged from 60.8° F. (16.0° C.) at San Pablo Bay to 77.2° F. (25.1° C.) off San Juanico Point. In general, offshore differences were small from southern California south to Magdalena Bay. A range of 68° F. (20.0° C.) to 72° F. (22.2° C.) prevailed over the greater part of the cruise.

* * * * *

Airplane Spotting Flight 59-14-Pelagic Fish: The inshore area from the Mexican Border to Bodega Bay was surveyed from the air (August 10-13, 1959) by the Department's Cessna 170 (1359D) to determine the distribution and abundance of pelagic fish schools.





Airplane spotting flight 59-14 (August 10-13, 1959).

Low clouds and haze hindered observations in some portions, but sufficient coverage was achieved during the four days to determine that pelagic fish schools were not plentiful in the inshore areas of southern and central California. Only 29 anchovy schools were observed south of Huntington Beach. These were loose and strung out, in very shallow water, five miles north of Oceanside. From Los Angeles Harbor to Huntington Beach, 121 schools were sighted. Of these, 61 were outside the Long Beach breakwater and one mile off Sunset Beach and Tin Can Beach. The remaining schools were small "breezing" spots centered one-half mile off the Belmont pier. Only 10 schools were found in Santa Monica Bay, all in shallow water very close to shore. Two small groups containing 26 schools were present off Port Hueneme and Point Mugu, and San Luis Obispo Bay contained 90 small, poorly defined schools, near the Avila piers. Of the 277 schools seen in Monterey Bay, 58 were in the extreme inshore area between Capitola and Aptos, and the remaining 219 were in the approximate center of the bay, showing up as medium to large sized, well defined spots. North of Monterey, 77 schools were seen, 75 close to the beach in Bolinas Bay and 2 just off the sandy beach at Bodega Bay.

On the afternoon of August 10 many "breezing" schools of fish were seen three miles southeast of Pt. Vicente. They behaved like sardines, but were erratic and difficult to observe. At any given time, 5 to 10 spots would be in sight but any one spot was visible for only a short period. On the same day, 7 small sardine schools were seen three miles south of Pt. Dume.

Note: Also see Commercial Fisheries Review, Sept. 1959, p. 22.

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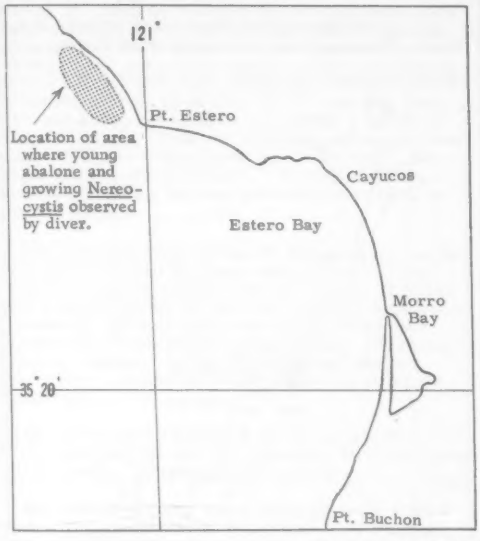
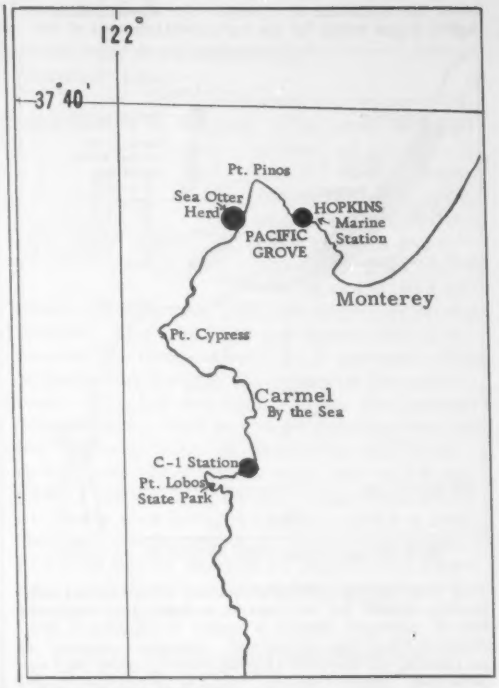
INVESTIGATION OF ABALONE RESOURCES CONTINUED:

M/V "Nautilus" Cruise 59N3, and Diving Boat "Mollusk" Cruise 59M1-Abalone: The abalone investigations were continued from April 15-June 30, 1959, by the California Fish and Game Department's research vessel Nautilus and diving boat

Mollusk in waters off Monterey and Morro Bay. The objectives were (1) to establish stations and habitat improvement areas; (2) to investigate sea otter-abalone relationships; (3) to recover tagged abalone; (4) to investigate skin-diving activity and areas of commercial activity; and (5) to recover abalone spat.





Area covered by M/V Nautilus on Cruise 59N3.

Because of unusually rough weather, activities were seriously curtailed during almost the entire cruise. Diving was limited to one day in April, five in May and one in June. During April and May the investigation worked out of Monterey and Carmel, and in June operations were moved to Morro Bay.

One station (C-1) established in Carmel Bay was found to be well worked over by skin divers. Abalone left in the area were deep in cracks and crevices. Since this area is a popular spot for skin divers, especially club outings and classes, it should provide good information on the effects of skin divers during a year's time.

Dives were made off Pacific Grove south of Pt. Pinos in a cove inhabited by 20-25 sea otters. Because of rough water and poor visibility it was not possible to cover the entire area, but from limited observations it was apparent that this small sea otter herd had eaten almost all the abalone in the area.

Recovery was made of three abalone tagged in 1956 off Hopkins Marine Station. None of these animals had grown during the two years they had been at liberty. All were found within a few feet of the point of release.

Because of the weather it was not possible to set out equipment for the recovery of abalone spat nor was it possible to examine the areas of former commercial abalone fishing between Monterey and San Simeon. During June, weather conditions were such that only three boats of the commercial abalone fleet remained at Morro Bay. By the latter part of the month even those had given up. The abalone investigation was able to make only one dive during June. However, two encouraging observations were made. Many small and sublegal (less than 8 inch) red abalone (H. rufescens) were found in the area north of Pt. Estero and a considerable growth of young kelp (Nereocystis) was observed on the bottom in that area.

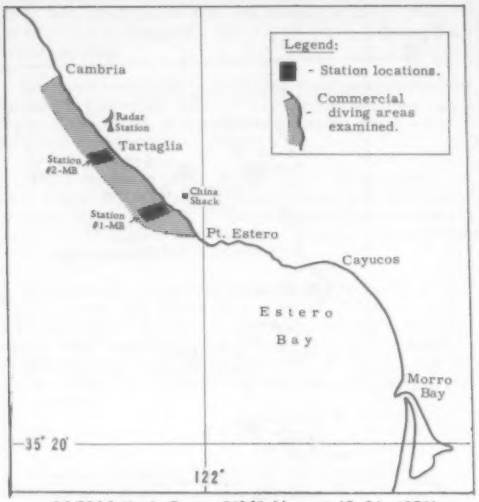
Although attempts were made to reach the diving areas whenever weather conditions permitted, it was not possible to conduct operations with any degree of safety or accuracy and attempts had to be abandoned.

Diving Boat "Mollusk" Cruise 59M2-Abalone: Investigations were continued in Morro Bay from August 12-31, 1959, by the Department's diving boat Mollusk to (1) establish abalone stations to be used for observation and study; (2) observe condition of abalone on commercial diving areas; (3) set out abalone spat collectors; and (4) conduct habitat improvement experiments.

Two experimental stations were established in commercial diving areas. Each station encloses an area roughly one-half by three-quarters of a mile extending from shore out to 100 feet. One station is located off what is known locally as the Second China Shack; the other is located south of the radar station off the Tartaglia ranch.

Three days were spent inspecting the grounds from Pt. Estero to Cambria in an attempt to as-

sess the condition of commercial areas. Encouraging signs were (a) the re-establishment of the



M/V Mollusk Cruise 59M2 (August 12-31, 1959).

kelp beds (Nereocystis) which had been almost completely absent for two years; and (b) the large number of sublegal (below 8 inches in diameter) red abalone (Haliotis rufescens). Abalone appeared to be feeding on the new kelp and new growth was apparent on several shells. This is in marked contrast to observations made last year when almost a complete lack of growth was found.

Two types of abalone spat collectors were fabricated and a set of each was placed in the two station sites. One consisted of abalone shells strung on a wire 15-feet long and suspended from floats; the other was made by enclosing 40-50 abalone and oyster shells in a chicken-wire basket. At each station, three float collectors and two bottom collectors were set out in water 15- to 35-feet deep ranging from 200 to over 600 yards offshore. One bottom collector was lost and could not be recovered.

Although inspection of the shells after approximately two weeks in the water revealed no young abalone, it was felt that this method of collection has value and should be tried again in the spring. Setting apparently did not occur at this time.

Because of the limited diving weather it was not possible to conduct habitat experiments.

Note: Also see Commercial Fisheries Review, April 1959, p. 37.

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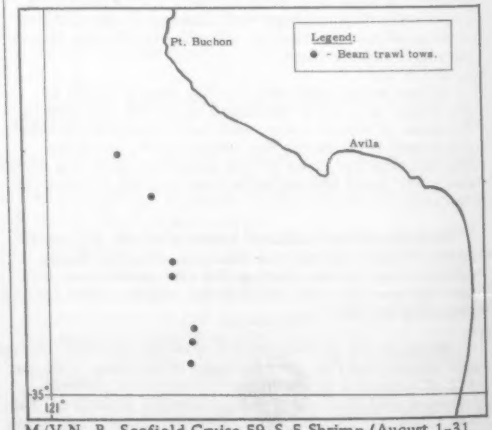
SHRIMP STUDY OFF CENTRAL AND NORTHERN CALIFORNIA COAST CONTINUED:

M/V "N. B. Scofield" Cruise 59S5-Shrimp: The coastal waters off central and northern California from the vicinity of Ft. Bragg to the vicinity of Avila were surveyed by the California Department of Fish and Game research vessel N. B. Scofield from August 1-31, 1959, for stocks of ocean shrimp (Pandalus jordani) both inside and outside the 3-mile limit. Other objectives were: (1) to determine size, sex, weight, and count of shrimp from different beds; (2) to determine size and weight of incidental fish catches; (3) to make bathythermograph casts to obtain temperatures in shrimp fishing areas; and (4) to collect specimens requested by other investigations.

A total of 86 tows was made with a 20-foot beam trawl. This included 14 tows in Area B-1 from Ft.



M/V N. B. Scofield Cruise 59-S-5 Shrimp (August 1-31, 1959).

Bragg to Pt. Arena, 64 tows in Area B-2 from just south of Pt. Arena to Santa Cruz and 8 tows in Area C off Avila. Depths ranged from 32 to 135 fathoms.

Tows made within the 3-mile limit around Bodega Bay and the Russian River failed to produce shrimp. Shrimp were found in limited concentration off Ft. Ross between 52 and 60 fathoms. Best tow in Area B-2 was at Ft. Ross where 71 pounds of shrimp per hour were caught. Quite a few shrimp of the year (approximately 400 individuals about 5 months old) were caught in a half-hour tow off Sander's Reef--just south of Pt. Arena. They averaged about 8.5 millimeters (about $\frac{1}{3}$-inch) in carapace length. This was the best representation of the 1959 year-class taken in all the tows. No larger shrimp were present. A total of 19 tows from the Farallon Islands to Santa Cruz failed to produce shrimp.

The bed of shrimp in the Ft. Bragg area was in good concentration within a depth range of 60 to 72 fathoms and coastwise for 4.5 miles. The two best tows produced 500 pounds each in a half-hour of trawling. Efforts to find the shrimp where the commercial fleet had left them in July produced negative results. Apparently they had shifted south about 4 miles but had maintained about the same depth.

Shrimp were found off Avila in limited concentration between 83 and 114 fathoms. Best tow here yielded about 120 pounds in a half-hour.

Samples of shrimp were obtained from 4 tows off Ft. Bragg, 11 off Ft. Ross, and 7 off Pt. San Luis. One hundred shrimp from each of these tows were sexed and measured. In addition, the entire contents of the gallon sample were counted and weighed.

The catch of incidental fish was comparatively light due to the use of a small unweighted foot rope. Counts and average weight of all species from 78 tows were recorded. In addition, all fish taken in 8 of the tows were measured. The biggest tow of fish weighed about 60 pounds. Two best shrimp tows contained only about 2.3 and 3.4 pounds of fish each. Pacific sand dabs (Citharichthys sordidus), slender sole (Lyopsetta exilis), juvenile rockfish (Sebastodes sp.), tomcod (Microgadus proximus) and juvenile hake (Merluccius productus) were the major constituents in the catches. Sand dabs accounted for most of the poundage while hake accounted for the greatest total number.

Forty-six bathythermograph casts were made in depths ranging from 47 to 75 fathoms. Casts were made in all areas where shrimp were caught and also in areas where shrimp were not taken.

Vessel thermograph and surface temperatures were recorded during all tows for the entire cruise. Temperatures ranged from 53.4° F. off Ft. Bragg on August 14 to 61.9° F. off Half-Moon Bay on August 23.

Note: Also see Commercial Fisheries Review, July 1959, p. 25.

Canned Fish

CONSUMER PURCHASES, AUGUST 1959:

Canned tuna purchases by household consumers in August 1959 were 965,000 cases, of which 54,000 cases were imported. By type of pack, domestic-packed tuna purchases were 199,000 cases solid, 613,000 cases chunk, and 100,000 cases grated or flakes. The average purchase was 2.0 cans at a time. About 31.3 percent of the households bought all types of canned tuna; only 2.0 percent bought the imported product. The average retail price paid for a 7-oz. can of domestic solid or fancy was 35.2 cents and for a 6½-oz. can of chunk 27.5 cents. Imported solid or fancy was bought at 29.7 cents a can. August purchases were lower than the 998,000 cases bought in July by 3.2 percent; retail prices in most cases were slightly higher.

During August household consumer purchases of California sardines were 34,000 cases; and 23,000 cases imported sardines. The average purchase was 1.6 cans at a time for California sardines and 1.9 cans for imported. Only 1.4 percent of the households bought canned California sardines and 1.7 percent imported. The average retail price paid for a 1-lb. can of California sardines was 24.5 cents, and for a 4-oz. can of imported 26.2 cents. Retail prices were higher for California sardines but slightly lower for imported canned sardines. August purchases of California sardines were lower than the 36,000 cases bought in July by 5.6 percent.

Canned salmon purchases in August 1959 were 201,000 standard cases, of which 104,000 cases were pinks and 53,000 cases reds. The average purchase was 1.2 cans at a time. About 14.2 percent of the households bought all types of canned salmon; 6.9 percent bought pinks. The average retail price paid for a 1-lb. can of pink was 56.5 cents and for red 87.0 cents. August purchases were down about 6.9 percent from the 216,000 cases bought in July.

Canned Foods

SURVEY OF MOVEMENT OF CANNED FOODS BY METHOD OF TRANSPORTATION:

A survey of canned food movement covering a period of one year ending June 30, 1958, has been released by the Bureau of the Census, U. S. Department of Commerce. The survey was underwritten by the Association of American Railroads. Data were compiled by nine commodity class groups: prepared meats; milk; fish and shellfish; fruits; seasonal vegetables; nonseasonal vegetables; juices; soups, baby foods, and jellies; and specialties. The movement was measured in tons and straightline ton-miles by four types of transport: rail, "for hire" motor carrier, private truck, and other. "Other" included predominantly intercoastal water and freight forwarder. The survey covered only commodities of domestic plants.

It is estimated that 349,000 tons of canned fish were transported at an average-haul of 1,318 miles. This average is longer than that for any other commodity. The next closest-average is for fruits with 866 miles. Milk, with 385 miles had the shortest average-haul. The average-haul for all commodities was 548 miles. When considering average-haul by type of transport, fish had the longest average-haul by rail of 1,676 miles. The average-haul by rail of all commodities was 765 miles. By motor carrier, fish had next to the shortest average-haul of 213 miles (milk had the shortest). Of all canned goods, 45 percent of the tons originated go by rail, 27 percent by "for hire" motor carrier, 23 percent by private truck, and 5 percent by other means. Of all canned fish, 62 percent of tonnage originated go by rail, 21 percent by "for hire" motor carrier, 7 percent by private truck, and 10 percent by other means. Packers of prepared meat haul 39 percent of their traffic in their own trucks.

Central Pacific Fishery Investigations

OCEANOGRAPHIC AND FISHERY SURVEY IN HAWAIIAN WATERS COMPLETED:

M/V "Charles H. Gilbert" Cruise 46: During a 30-day cruise that ended on October 17, 1959, the U. S. Bureau of Commercial Fisheries research vessel, the Charles H. Gilbert, completed an oceanographic and fishery survey in Hawaiian waters. This cruise was one of a series being conducted by the Bureau's laboratory in Honolulu to learn more about the skipjack tuna and the waters in which they live.

U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert.

The biologists believe that season skipjack are associated with a certain type of water, an extension of the California Current, and that the success of the Hawaiian summer fishing season may depend on the time of entry and amount of this water in the Hawaiian area. Unlike the summer months when the entire Island chain was surrounded by the California Current Extension and when numerous tuna schools were sighted close to land, the cruise just completed showed that the higher salinity water from the North Pacific had moved in and only a few fish schools were sighted.

Although very few skipjack schools were fished, the Field Party Chief reports that the vessel was able to successfully fish one school of medium size (10-18 pounds) skipjack using tilapia as bait. The tilapia is a tropical fish species which was introduced in

Hawaii several years ago as a possible supplement to the nehu, a less hardy native bait species.

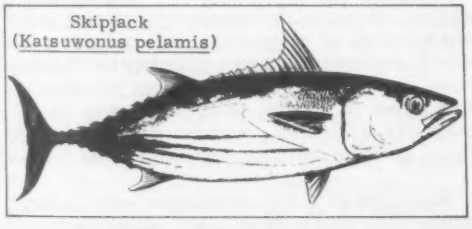
In addition to the oceanographic and biological surveys, underwater movies were taken of skipjack during fishing operations. The Honolulu laboratory is the first to successfully record on film the behavior of the skipjack in their natural environment. These records will be studied in order to understand more fully the behavior of the tunas.

During the cruise flagline fishing was carried out and net tows were made to determine the kinds and abundance of marine animals to be found in the various types of ocean water encountered during the cruise.

* * * * *

SKIPJACK TUNA LANDINGS IN HAWAII INCREASE ACCORDING TO PREDICTION:

In March 1959 a prediction was made by the fisheries biologists of the U. S. Bureau of Commercial Fisheries' Honolulu Laboratory that the 1959 landings of skipjack tuna in Hawaii would be better


Skipjack
(Katsuwonus pelamis)

than those for an average season. Landings (preliminary figures) for the first 9 months of 1959 amounted to 9.8 million pounds as compared with 8.6 million pounds landed in a similar period of 1958. Thus, it seems that the prediction was essentially satisfied. By the method of prediction it would have been anticipated that both the 1957 and 1958 landings would fall substantially below normal, and such was the case; the 1957 landings through September were 5.2 million pounds and those of 1958, 6.4 million pounds. As the prediction was based on environmental changes alone, a look at some of the characteristics of the stock of skipjack available to the Hawaiian fishery was suggested. The first characteristic chosen for such study was the pattern of the distribution of fish sizes in the landings at the Honolulu tuna cannery.

In a normal fishing season, the live-bait fishermen purposely bypass schools of the smaller skipjack in order to fish the more preferred size, the 18-22 pound fish. The larger, 28-32 pound fish are less desirable as they are "two-pole fish," and two-pole fishing has the effect of reducing the number of fishermen by one half.

The skipjack fishery in Hawaiian waters is seasonal with the bulk of the annual landings made between May and September and with a peak as a rule during July. A large percentage of the fish caught during these months are normally 18-22 pounds (70-75 cm.) with lesser weights of small fish, 4-8 pounds (45-55 cm.) and of large fish, 28-32 pounds (80-83 cm.). During the off-season the majority of the skipjack landed at the Honolulu cannery consist of the smaller 4-8 pound size.

Beginning in August 1959 length measurements of skipjack were taken on board fishing vessels during unloading at the Honolulu cannery. Some 25 fish from each of the schools identifiable in the catch were measured. Other data, such as numbers of schools sighted, the number consisting of small fish and not fished, the area of catch, were recorded for each vessel.

The results to the end of September show a distribution of size among the catch that is different from previous observed distributions. A group of fish from 24 to 31 pounds in weight dominated the catch during August and September, as compared with an expected dominant group at 18-22 pounds. Furthermore, the middle-size group, normally 18-22 pounds, was represented during August by a group from 11-16 pounds and during September the mode for this group could not be identified. The small-size group was present in about the expected proportions.

Although data are very inadequate as yet, it is interesting to speculate on the reason for these results; 1958 was a poor season. If this resulted from low availability, i.e., the "season fish" (18-22 pounds) were elsewhere, these fish would not have been removed from the population and, thus, one year later (1959), would dominate. Another possibility is that there was a comparatively low survival of eggs and larvae during the natal year of the 1959 "season fish," in turn resulting in a low abundance of those fish in Hawaiian waters in 1959. Several years' additional length frequency data, along with additional corollary life history, migration, and environmental data are necessary before it will be possible to do more than speculate concerning the causes of these year-to-year variations in size groups.

Crabs

FUTURE BLUE CRAB RESEARCH PROGRAMS DISCUSSED AT VIRGINIA MEETING:

The Blue Crab Committee of the Atlantic States Marine Fisheries Commission, with representatives from Maryland, Virginia, North Carolina, South Carolina, Florida, and the U. S. Bureau of Commercial Fisheries, met during the week of September 14, 1959, at the Virginia Fisheries Laboratory, to discuss future blue crab research to be conducted by Federal, state, and private agencies along the Atlantic coast.

Maryland packers have been greatly concerned by the scarcity of crabs in their section of the Chesapeake Bay all summer. They question whether the present laws are in harmony with the findings of research biologists. Although Virginia packers have not handled as much crab meat this year as in some previous years, they do not believe that this summer's crop has been much below average.

The Committee unanimously recommended that future biological investigation of the blue crab be directed at ascertaining the causes for these serious fluctuations in abundance. For a number of years, biologists at the Virginia Laboratory have been studying the hydrographic, biological, and other factors which affect the survival of larval and juvenile crabs both in Chesapeake Bay and its many tributaries.

One of the outstanding needs of the scientists is to be able to measure accurately the marketable crop produced from each year's spawning. In order to do this, they must determine the size, sex, and age composition, and the spawning history of crabs in the commercial catch. They must also be able to measure the amount of effort required to catch a definite number of crabs.

Virginia's marine laboratory is currently carrying on an extensive tagging program to determine the movement of crabs within each river system and also the movement of crabs from one river to another or to the Bay. The chief crab biologist at the Virginia Fisheries Laboratory stated: "We are extremely interested in discovering the contribution made by the stocks of crabs in the Rappahannock, York, James, and Back rivers to the winter crab fishery which develops out in the Bay each winter. This information, along with knowledge gained from other areas of research, will permit a better understanding of population fluctuations, and permit us to predict the future abundance of crabs. Research now in progress will also provide information on which to base corrective measures."

Records of the commercial catch indicate that there have been wide fluctuations in the number of pounds of crabs landed each year, but since 1929 the total catch landed in Virginia has exceeded 30 million pounds 12 times. The best catch was in 1950 when over 50 million pounds of crabs were marketed. Although the average year's catch falls below the 30 million mark, crab fishermen have a tendency to remember the good years and think of them as being average. Thus, their concept of average is usually too high.

Fisheries Loan Fund

LOANS APPROVED THROUGH SEPTEMBER 30, 1959:

As of September 30, 1959, a total of 624 applications for fisheries loans totaling $20,432,430 had been received. Of these, 338 ($8,161,863) have been approved, 228 ($6,328,063) have been declined or found ineligible, 51 ($2,280,556) have been withdrawn, and 19 ($3,001,089) are pending. Several of the pending cases have been deferred indefinitely at the request of the applicants. Sufficient funds are available to process new applications when received.

The following loans have been approved between July 1 and September 30, 1959:

New England Area: Boat Fairhaven Corp., New Bedford, Mass., $49,000; Charles S. Mitchell, Jr., Vinalhaven, Maine, $2,000; Peter Condelli, Medford, Mass., $25,000; Risdal & Anderson, Inc., New Bedford, Mass., $47,500.

South Atlantic and Gulf Area: Harry E. Robinson, Key West, Fla., $5,000; Clyde J. O'Daniel, Key West, Fla., $7,441; Billy Jay Brown, Long Beach, Miss., $12,000; Frank W. Scott, Brownsville, Texas, $14,000; H. J. & C. J. Eymard, Cut Off, La., $19,805; T. Irvin Knowles, Key West, Fla., $5,290; Everglades Shrimp Co., Everglades, Fla., $19,645; W. D. Henderson, Rockport, Texas, $24,000; Ralph R. Combs, Marathon, Fla., $9,062; Pioneer Shrimp Co., Tampa, Fla., $32,000; M. L. Frakich, Aransas Pass, Texas, $40,000.

California: Ove A. Holm, Morro Bay, $2,500; Carl Hanken, et al, San Diego, $80,000.

Pacific Northwest Area: Mrs. Anna Ancich, Gig Harbor, Wash., $34,137.

Alaska: Vernon Eckman, Juneau, $1,250; Peter G. Olsen, Kodiak, $9,000.

Hawaii: M. Hamabata & S. Tokumine, Honolulu, $10,000.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-SEPTEMBER 1959:

Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, 1.8 million pounds (value $0.9 million) of fresh and frozen fishery products were purchased in September 1959 by the Military Subsistence Supply Agency. This was lower than the quantity purchased in August by 16.8 percent, but was 4.7 percent higher than the quantity purchased in September 1958. The value of the purchases in September this year was higher by 7.6 percent as compared with the preceding month and up 2.0 percent from September 1958.

Table 1 - Fresh and Frozen Fishery Products Purchased by the Military Subsistence Supply Agency, September 1959 with Comparisons

QUANTITY				VALUE			
September		Jan.-Sept.		September		Jan.-Sept.	
1959	1958	1959	1958	1959	1958	1959	1958
(1,000 Lbs.)				($1,000)			
1,758	1,679	17,488	17,875	924	906	8,973	10,204

During the first nine months of 1959, purchases amounted to 17.5 million pounds (valued at $9.0 million)--a decrease of 2.2 percent in quantity and 12.1 percent in value as compared with the first nine months of 1958.

Prices paid for fresh and frozen fishery products by the Department of Defense in September averaged 52.6 cents a pound, about 11.9 cents higher than the 40.7 cents paid in August, but 1.4 cents less than the 54.0 cents paid during September 1958.

Canned Fishery Products: Tuna was the principal canned fishery product purchased for the use of the Armed Forces in September 1959. In the first nine months of 1959, purchases of canned tuna were down about 36.4 percent, canned

Table 2 - Canned Fishery Products Purchased by the Military Subsistence Supply Agency, September 1959 with Comparisons

Product	QUANTITY				VALUE			
	September		Jan.-Sept.		September		Jan.-Sept.	
	1959	1958	1959	1958	1959	1958	1959	1958
	(1,000 Lbs.)				($1,000)			
Tuna	370	461	2,502	3,931	162	1/	1,159	1/
Salmon	3	1	18	1,402	3	1/	14	1/
Sardine	4	-	974	93	1	1/	144	1/
Totals	377	462	3,494	5,426	166	1/	1,317	1/

1/Unavailable.

salmon down 98.7 percent, but canned sardine purchases were up tenfold from the same period of 1958. The sharp drop in the purchases of canned salmon from January-September this year is not significant as heavy purchases of this item are usually made in the month of October.

Note: Armed Forces installations generally make some local purchases not included in data given; actual total purchases are higher because it is not possible to obtain local purchases.

Fish Meal

QUICKLIME PROCESSING METHOD DEVELOPED:

A process in which fish meal is prepared from fish or fish waste with the addition of quicklime or slaked lime has been developed. The amount added--not more than 10 percent of the weight of the fish material used--is sufficient to convert the hydrophilic protein material to a gel.

A batch of fish is loaded into a hopper and carried to the inlet of a mill by a conveyer belt. The material receives 5 percent by weight of quicklime from a container with a controllable outlet valve while it is on the conveyer. The mixture is ground down to pass through a 2-in. (5.1-cm.) mesh, the resultant paste thus obtained being transferred to a drying yard, where it is spread out in thin layers and stirred once or twice to accelerate the drying. When dried, it is ground to the required particle size. Oil may be recovered from the fish by solvent extraction before the addition of the lime. It is claimed that this method gives a light-colored, pleasant-smelling product which is relatively cheap to produce (Food Manufacture, Feb. 1958).

Frozen Fish

REFRIGERATED TRUCK HAULING COSTS MAY INCREASE:

Some indication of operating problems in connection with the proposed frozen food code of the U. S. Association of Food and Drug Officials of the United States is already at hand. A prominent motor carrier handling fresh and frozen fishery products in the Pacific Coast States has proposed rate increases on frozen fish from the Pacific Northwest to California. The reason given for the requested increases is that excessive costs of maintaining low temperatures (0° F. or lower at all times) on frozen fish make it more expensive to handle.

Fur Seals

ALASKA FUR-SEAL SKIN HARVEST IN 1959 LOWER:

The fur-seal industry, operated by the U. S. Department of the Interior's Bureau of Commercial Fisheries, began its annual sealing season on the Pribilof Islands, Alaska, on June 27 and ended on August 20, 1959. The Pribilofs normally supply about 80 percent of the world's annual production of fur-seal skins.

Fur seals swimming.

Soon after the season opened, it was evident that 3-year-old seals, which usually make up most of the harvest, were arriving at the Islands in numbers far below normal expectations. The shortage of this year-class became more pronounced as the season advanced. At the conclusion of the sealing operations, only 58,251 skins had been obtained as compared with 78,919 skins harvested in 1958.

The low incidence of 3-year-old animals in 1959, which can be at least partly explained by a record loss of new-born pups on the Islands in 1956, points to a corresponding shortage next year in the appearance of 4-year-olds. A relatively

low loss of young seal pups on the Pribilofs during the summer of 1957, however, gives promise of a more nearly normal harvest of 3-year-old fur seals in 1960.

* * * * *

PRICES FIRM FOR ALASKA FUR-SEAL SKINS AT FALL AUCTION:

At the semi-annual auction sale of Alaska fur-seal skins held in St. Louis, Mo., on October 23, 1959, a total of 24,018 fur-seal skins were sold for $2,479,441, for the account of the United States Government. The skins are the product of the sealing operations of the U. S. Bureau of Commercial Fisheries on the Pribilof Islands.

The annual production of the Pribilof Islands is divided, under treaty, 70 percent to the United States and 15 percent each to Canada and Japan. The United States and Japanese skins, plus lesser quantities of South African and South American skins, all processed and ready for use in garment manufacturing, are disposed of at sales each spring and fall.

Of the three shades of skins auctioned, skins dyed black sold at an average of $109.17, whereas matara (brown) dyed skins brought $99.85, and kitovi (midnight blue) brought $97.65 a skin. The average for all United States skins was $103.23 per skin as compared with an average of $101.46 for the Japanese-owned skins, $44.99 for South African skins, and $51.42 for skins from Uruguay.

Although the average price for United States-owned skins was the highest on record (the average of the previous sale on April 10, 1959, was $99.71[1/]), the prices reflected a slight decline grade for grade. The unusually good quality of the offerings sold at this auction caused the average to be somewhat higher.

1/Revised.

Note: Also see Commercial Fisheries Review, January 1959, p. 30 and June 1959, p. 35.

Great Lakes Fisheries Exploration and Gear Research

EXPLORATORY SMELT FISHING IN LAKE ERIE CONTINUED:

M/V "Active" Cruise 5: During the period August 27-September 6, 1959, the U. S. Bureau of Commercial Fisheries chartered vessel Active continued exploratory smelt fishing operations in Eastern Lake Erie.

Fig. 1 - Smelt catch from Lake Erie made by M/V Active.

Thirty tows were completed between Fairport Harbor, Ohio, and Sturgeon Point, N. Y., in depths of 5-25 fathoms

Fig. 2 - Another large catch of smelt from Lake Erie made by M/V Active.

using a 50-foot two-seam balloon trawl with a 1½-inch mesh cod end. Catches ranged from trace amounts to 600 pounds of large smelt per hour. Mixed catches also produced small amounts of burbot, white suckers, and whitefish. Best fishing results were obtained in the 10-13 fathom depths north of Dunkirk, N. Y., and northwest of Erie, Pa.

Large surface schools of emerald shiners were observed daily. Small mid-water echo traces off Dunkirk, N. Y., were unidentified. No seine sets were attempted.

Surface temperatures equaled previously recorded high temperatures for eastern Lake Erie (79.5° F.). Bottom temperatures ranged from 41° F. at 25 fathoms to 76° F. at 5 fathoms. Thermal stratification continued well defined throughout the Eastern and East Central basins.

Note: Also see Commercial Fisheries Review, October 1959, p. 26 and November 1959, p. 35.

Great Lakes Fishery Investigations

WESTERN LAKE ERIE BIOLOGICAL RESEARCH CONTINUED:

M/V "George L." Cruise 7: The U. S. Bureau of Commercial Fisheries research vessel George L. participated in a cooperative survey of oxygen conditions in the Central Basin of Lake Erie in September and continued investigations on young-of-the-year yellow pike (walleyes). Preliminary compilations of trawl catches during a 3-day study of fish populations in one area during August were completed.

Normal dissolved oxygen conditions were present in waters of the Western Basin covered by the George L. during the August cruise. Severe oxygen depletion was, however, observed near the bottom in late August in the Central Basin during surveys by the Ohio Division of Wildlife and Ontario Department of Lands and Forests. A cooperative synoptic survey of dissolved oxygen concentrations in the Central Basin was undertaken in early September to determine the degree and extent of oxygen depletion.

No oxygen was found near the bottom in water 40 feet deep at one station 5 miles north of Sandusky Harbor. Severe oxygen deficiencies of less than 3 parts per million were found in the hypolimnion, which often extended 20 feet above the bottom, in Canadian and United States waters from Sandusky and Wheatley east to Port Stanley and Fairport. Samples of fish and bottom organisms were taken at several locations to compare with samples taken in past years.

Young yellow pike began to appear in trap-net and seine catches of commercial fishermen in the Western Basin. By the end of September these fish averaged about nine inches long and one 10.5-inch fish was observed. The trawling survey of the George L. showed that these young yellow pike are now found in all waters of the Western Basin. They feed on spot-tail minnows, emerald shiners, and young yellow perch.

Intensive around-the-clock trawling at 3 stations, on 4 consecutive days (July 27-30), by the George L. and Madtom near East Harbor was conducted to determine variations in trawl catches over a short period of time. Fifty 10-minute tows captured 174,966 fish of various species. The numbers of young-of-the-year fish taken were: yellow perch 102,450; spot-tail shiner 53,990; trout-perch 3,097; sheepshead 1,713; white bass 1,277; white crappie 659; gizzard shad 339; yellow-pike 79; carp 59; smelt 33; and one each of bullhead, muskellunge, and silver chub. Only 11,267 fish one year old or older were captured and most of them were adult spot-tail shiners and trout-perch. In a period of less than 2 days, the trawl catch of young-of-the-year yellow perch at one station varied from 14 to 19,250 fish per 10-minute tow. During the first 48 hours of trawling, 952 fish in good condition and of various sizes and species were fin-clipped and returned to the water where they were captured. Only 12 of these fish were eventually recaptured in the trawl hauls. Only 9 percent of the perch, 23 percent of the sheepshead, and 21 percent of the bullhead stomachs contained fish.

* * * * *

WESTERN LAKE SUPERIOR FISHERY SURVEY CONTINUED:

M/V "Siscowet" Cruise 6: Studies were conducted (Sept. 14-21, 1959) by the U. S. Bureau of Commercial Fisheries research vessel Siscowet in Presque Isle Bay of Stockton Island, east of Oak Island, east of Outer Island, west of Outer Island, and southeast of Cat Island. The objectives were to observe the vertical distribution of the various types of chubs (Leucichthys sp.) and to locate young-of-the-year lake trout, whitefish, menominee whitefish, and lake herring (L. artedi).

Oblique gill-net sets were made over known chub grounds to determine the vertical distribution of the various species of chubs. Five $2\frac{1}{4}$-inch (stretched measure) gill nets were fished obliquely from the surface to the bottom at 286 feet. All of the L. kiyi, 60 percent of the L. zenithicus, and 15 percent of the L. hoyi were nearly or entirely ripe.

A gang of five nets ($2\frac{1}{4}$-inch) was set east of Outer Island on a steep bank in water from 20 to 66 fathoms. This set was made to measure the bathymetric distribution of the various species of chubs. All of the L. kiyi, 80 percent of the L. zenithicus, and 3 percent of the L. hoyi were nearly or entirely ripe.

Trawl tows were made at various depths west of Outer Island and southeast of Cat Island. The catches consisted mainly of ninespine sticklebacks, trout-perch, slimy muddlers, and smelt. One young-of-the-year lake trout was captured at 25 fathoms west of Outer Island. A very few young-of-the-year whitefish, menominee whitefish, and lake herring were also captured.

Practically no fish were captured above 18 fathoms in trawl tows made east of Oak Island. A heavy northeast sea the previous day apparently swept the grounds and forced all species into 20-30 fathoms where small numbers of lake trout, pygmy whitefish, L. hoyi, ninespine sticklebacks, smelt, and slimy muddlers were taken.

Surface water temperatures varied from 62.7° F. in Presque Isle Bay to 56.3° F. west of Outer Island.

M/V "Siscowet" Cruise 7: Environmental conditions were studied (Sept. 28-Oct. 7) at three index stations located (1) southeast of Stockton Island, (2) northeast of Bear Island, and (3) east of Pike's Bay. In addition to the fishery and environmental studies at the index stations, trawling operations were conducted west of Outer Island in search of young-of-the-year lake trout, whitefish, menominee whitefish, and lake herring. A six-hour limnological survey was conducted northeast of Bear Island to measure environmental changes which may occur during the day.

Trawl tows were made and standard gangs of gill nets were fished at each index station. Water, plankton, and bottom samples were collected in addition to observations of water temperatures, Secchi-disc readings, and currents.

Very few of the chubs (Leucichthys sp.) appeared ready to spawn as compared to a high percentage of ripe chubs captured at other locations in the Apostle Island area during cruise 6.

Trawl tows southeast of Stockton Island took mainly trout-perch, ninespine stickleback, slimy muddlers, and smelt. Small numbers of lake trout, lake herring, pygmy whitefish, and L. hoyi were also taken.

Trawl tows northeast of Bear Island took many slimy muddlers and ninespine sticklebacks. One hundred L. hoyi and two L. zenithicus were also captured.

Trawl tows east of Pike's Bay took 633 smelt, 203 L. hoyi, with lesser numbers of whitefish, lake trout, trout-perch, slimy muddlers, ninespine stickleback, and burbot.

Trawl tows west of Outer Island were made at depths ranging from 6 to 27 fathoms. The most striking catch was three young-of-the-year (age-group O) lake trout taken in one 15-minute tow in water 17 to 21 fathoms. Other age-group O fish taken included 7 whitefish, 7 menominee whitefish, and about 40 smelt. Eight female pygmy whitefish caught at 27 fathoms appeared to be ripe. There were no males captured. Large numbers of trout-perch, ninespine sticklebacks,

and slimy muddlers were taken at this location.

The environmental survey northeast of Bear Island (29 fathoms) consisted of the collection of plankton and water samples, bathythermograph casts and Secchi-disc readings over a six-hour period. The studies began at 1130 (EST) and were repeated at 1330, 1530, and 1730.

Surface water temperature varied from 55.8° F. east of Pike's Bay to 53.3° F. northeast of Bear Island. Bottom temperature varied from 54.0° F. at Pike's Bay to 41.7° F. northeast of Bear Island.

Note: Also see Commercial Fisheries Review, Nov. 1959, p. 36.

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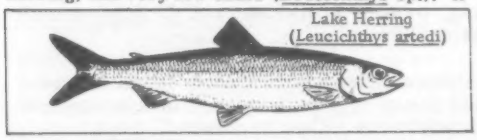
SURVEY OF EASTERN LAKE SUPERIOR CONTINUED:

M/V "Cisco" Cruise 5: Experimental fishing and limnological studies were continued in eastern Lake Superior by the U. S. Bureau of Commercial Fisheries research vessel Cisco. The areas of operation during August 11-25, 1959, were from Marquette, Mich., to Whitefish Bay, and northward to Michipicoten Island.

Standard gangs of gill nets were set at 25, 50, 75, and 100 fathoms off Grand Marais. The catch at 25 fathoms included 26 lake trout, many lake herring, and very few chubs (Leucichthys sp.). A


Lake Herring
(Leucichthys artedi)

fair catch of L. hoyi and L. reighardi and 3 lake trout were in the 50-fathom set. L. kiyi was abundant at 75 fathoms and a few L. hoyi, L. reighardi, and L. zenithicus were represented. A very light catch at 100 fathoms included 16 L. kiyi, 2 lake herring, and 1 round whitefish. The last-mentioned species had not been previously reported from that depth.

Catches from standard gangs of gill nets set at 25, 35, 50, and 70 fathoms in Whitefish Bay indicate an appreciably larger population of L. hoyi as compared with the Grand Marais area. This species dominated the catch at 25 fathoms, and together with L. reighardi made up most of the catch at 35, 50, and 70 fathoms. The catch at 70 fathoms, however, was very light. Small numbers of L. nigripinnis and L. zenithicus were caught at the shallower depths. Smelt were common at 25 fathoms, a few deep-water sculpins were caught at 70 fathoms and 2 lake trout were caught at 35 fathoms.

A standard gang of gill nets with 3,600 feet of large mesh (3½ to 6-inch) added was set 25 miles southwest of Michipicoten Island in 50 fathoms.

Lake Trout
(Christivomer namaycush)

Lake trout were fairly abundant (41 caught) and chubs were scarce. A 7-pound male siscowet, the only one of this subspecies taken, appeared to be ripe.

Yellow perch and round whitefish were very abundant in a very shallow (2-3½ fathom) gill-net set just outside Munising Bay. Round whitefish and white suckers were numerous in a shallow (5 fathoms) set inside the Bay. The deepest set in the Bay (33-35½ fathoms) produced numerous whitefish and L. hoyi, and a few smelt, burbot, L. nigripinnis, alewives, and lake trout.

Trawling at various depths (14-20 fathoms) in Shelter Bay caught the first young-of-the-year (age-group 0) lake trout (2.3 inches) this year.

Ninespine Stickleback
(Pungitius pungitius)

Cottus cognatus was generally abundant and occasional catches were made of ninespine stickleback and pygmy whitefish.

Twenty-seven of the 78 lake trout caught at various locations were tagged and released.

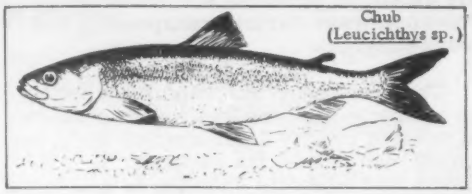
Extreme temperatures of 9.4° C. (48.9° F.) and 20.0° C. (68.0° F.) were recorded at the surface. The surface of the water was warming at all areas. Regular limnological stations off Grand Marais (45 fathoms) and in Whitefish Bay (70 fathoms) were visited.

M/V "Cisco" Cruise 6: The Cisco surveyed (September 2-14, 1959) the Marquette-Keweenaw Bay area, repeating for the most part work of cruises 2 and 4 to observe possible seasonal changes in fish distribution and abundance.

Standard gangs of gill nets were set overnight at 15 fathoms in Shelter Bay; 20, 25, 35, and 50 fathoms off Marquette; 25, 35, 50, and 80 fathoms in Keweenaw Bay; and for two nights at 75 and 100 fathoms off Marquette.

Five lake trout were caught in Shelter Bay, 16 off Marquette (4 at 20 fathoms, 9 at 25 fathoms, and 3 at 35 fathoms), 4 in Keweenaw Bay (3 at 25 fathoms and 1 at 35 fathoms). Nineteen lake trout were marked with "spaghetti" tags and released.

Chub (Leucichthys sp.) catches off Marquette were, as in cruise 4, very light at 25 fathoms (11 taken), and rather light at 50 fathoms (73). The chub catches at 35 fathoms (125), 75 fathoms (484), and 100 fathoms (203) were noticeably heavier than similar ones made during cruise 4, even allowing for the fact that in cruise 6 the sets at 75 and 100 fathoms were for two nights. L. reighardi and L. hoyi constituted the bulk of the catches except at 75 fathoms where L. reighardi and L. kiyi were


Chub
(Leucichthys sp.)

most important, and at 100 fathoms where L. kiyi made up 93 percent of the catch.

In Keweenaw Bay the chub catches were appreciably lighter than during cruise 4, except at 80 fathoms, where the reverse was true. A total of 36 chubs was taken at 25 fathoms, 154 at 35 fathoms, 134 at 50 fathoms, and 62 at 80 fathoms. L. hoyi

Smelt
(Osmerus mordax)

predominated at 25 fathoms (55 percent of catch), 35 fathoms (93 percent), and 50 fathoms (76 percent). L. kiyi was somewhat more numerous than L. hoyi at 80 fathoms. L. reighardi was the second most numerous chub at the 3 shallower depths. Other species caught in the gill nets were L. nigripinnis and L. zenithicus (small numbers in most sets), lake herring (105 weighing 93 pounds in Shelter Bay, few elsewhere), smelt (198 at 20 fathoms off Marquette), burbot (commonest in the shallow sets), longnose suckers, whitefish, and round whitefish (a few of the latter 3 species in Shelter Bay only).

Trawls were towed at various depths from 14 to 42 fathoms in Shelter Bay, 7 to 21 fathoms near Traverse Island in Keweenaw Bay, and 25 to 42 fathoms off Pequaming in Keweenaw Bay. Only four young-of-the-year lake trout were caught in Shelter Bay, as compared with as many as a dozen or more per 10-minute tow taken by the Cisco in the same area during 1953. Only one other age-group 0 lake trout had been caught previously this year. The Shelter Bay drags also took moderate numbers of slimy sculpins, a large number of ninespine sticklebacks at 38-42 fathoms (few at other depths), and an occasional L. hoyi (deeper tows), smeltfry, and pygmy whitefish. Trawl catches off Traverse Island in Keweenaw Bay were similar to the shallower tows in Shelter Bay, except that there were no lake trout. Eight, 7 to 10-inch, lake trout were taken off Pequaming in Keweenaw Bay, all of them hatchery reared. Otherwise the catch composition was about the same as in the deeper tows in Shelter Bay.

Hydrographic stations in Shelter Bay, off Big Bay Point, and in Keweenaw Bay were visited for the third time this year. Surface water temperature generally cooled from about 18° C. (64.4° F.) at the beginning of the cruise to about 15° C. (59.0° F.) at the end. In Keweenaw Bay, however, strong southwest and west winds created an upwelling which temporarily resulted in surface water temperatures of only 5.2° to 10° C. (41.3° to 50.0° F.) over nearly the entire Bay. Extremes during the cruise were 5.2° C. and 19.3° C. (41.3° and 66.7° F.)

Note: Also see Commercial Fisheries Review, Nov. 1959, p. 37.

Gulf Exploratory Fishery Program

EXPLORATORY TRAWLING FOR SHRIMP OFF PUERTO RICO AND VIRGIN ISLANDS:

M/V "Oregon" Cruise 62: Extremely poor shrimp trawling conditions were found to exist in the Puerto Rico-Virgin Island area during a 31-day cruise (ended October 17) made by U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon. Sixty-six exploratory shrimp trawl drags were made in depths of 17-380 fathoms to evaluate the shrimp stocks of the area.

Approximately 2,000 miles of depth-recorder transects were made over the 300-mile area in an attempt to locate clear bottom, with little success. On the shelf (inside of 50 fathoms), coral, rock, and sponge were encountered on every drag. The "slope" beyond 50 fathoms abruptly drops to 300-500 fathoms in most areas, with rock and coral as principle bottom constituents. Sixteen trawls were torn up during the survey and minor gear damage occurred on most of the remaining drags. Trawling stations were made in all locations that depth-recorder tracings indicated a slight hope of getting the gear back.

Pink spotted shrimp were found in small numbers in 30-45 fathoms along the northern edge of the shelf. Drags of

M/V Oregon Cruise 62 (September 16-October 17, 1959).

5-10 minutes would produce up to two pounds of shrimp (size 26-30 and 41-45 shrimp to the pound). Longer drags in this depth range resulted in gigantic sponge catches or tear-ups.

A very restricted smooth area in 150-300 fathoms off Aguadilla, Puerto Rico, was explored for royal-red shrimp. Not a single specimen was caught, although the smaller deep-water shrimp, Penaeopsis megalops (usually associated with royal-red shrimp in the known areas), was present in small numbers. Elsewhere, deep-water trawling produced only a small number of another species of penaeid shrimp (Aristaeus).

Eight drags were made along the northern edge of Saba Bank in depths of 19-380 fathoms. The only shrimp caught were 5-count scarlet shrimp in 360-380 fathoms at a rate of about 10 pounds per hour.

Small numbers of red snappers were caught in most successfully retrieved drags from inside of 50 fathoms. Other food fish were absent in the catches. Depth-recorder tracings indicated the presence of small school fish in several locations north of the Virgin Islands, hovering over bottom that was impossible to trawl with the gear on hand.

Numerous large schools of tuna were observed along the northeastern edge of the shelf. Several trolling captures yielded blackfin tuna ranging from 3-16 pounds each. All of these fish had been feeding on small Spanish sardines (Sardinella anchovia). In Mona Passage, scattered large tuna were observed on one occasion.

Inspection of Fishery Products

CRAB MEAT FIRST FRESH FISHERY PRODUCT UNDER CONTINUOUS INSPECTION:

Tentative approval was granted recently to a crab-meat processing plant in Brunswick, Ga., for use of the U. S. Department of the Interior (USDI) continuous inspection shield on unfrozen crab meat. This marks the first use of the shield on products not protected by frozen storage during transporting and marketing.

The success of this venture depends on adequate handling and rapid turnover to prevent quality deterioration while the shield remains on the package. It is believed that adequate handling is now being practiced commerciallly on crab meat to an extent which will allow the use of the shield.

* * * * *

LOT INSPECTION SERVICES EXPANDED:

Lot inspection of fishery products is now available through the Bureau of Commercial Fisheries, U. S. Department of the Interior, in the following cities: St. Petersburg Beach, Fla.; Brownsville, Texas; New York, N. Y.; Boston, Mass.; Bellingham and Seattle, Wash.; and San Francisco, Calif. Requests for inspection service or information on both lot and continuous inspection services offered by the U. S. Bureau of Commercial Fisheries may be obtained through the inspectors located in these cities.

Inspection criteria include Federal, State or company specifications as well as the official U. S. Department of the Interior's Standards for grades of processed fishery products. Bids and purchase specifications requiring Government inspection and certification of fishery products should state "USDI Inspection and Certification Required." The inspector may be requested to certify the product lot as to (1) quality or grade, (2) conditions, or (3) quality and condition, following his examination. In addition, the inspector may be requested to check the loading and to provide an official certificate of loading for a specific lot of fishery products being shipped. The grade certificate and stamp "Officially Sampled" in conjunction with the date on the shipping cases constitute an assurance of the quality of the product when it was forwarded. The costs of these inspection services average $6 per hour, including travel time from the office.

Marketing

EDIBLE FISHERY PRODUCTS MARKETING PROSPECTS, WINTER-SPRING 1959/60:

Civilian per capita consumption of fishery products in the winter-spring of 1959/60 is expected to be about the same as the year-earlier rate. Consumption of frozen products may be up a little; the rate for canned fish will be lower. Retail prices of frozen fishery products well into spring 1960 are expected to average somewhat lower than the relatively high ones which prevailed from fall 1958 to early spring 1959, but those of canned fish will be a little higher.

Supplies of edible fishery products are expected to be somewhat lower through early spring 1960 than a year earlier. More of the frozen commodities will likely be available than a year earlier, but supplies of fresh fish will be seasonally light until next spring. Because of reduced output in 1959, supplies of the seasonally-packed major canned fish (principally salmon, Maine sardines, and California sardines) will be lower than a year earlier at least until the 1960 packs start moving to market after mid-1960. Output of canned tuna in 1959 was slightly below the record 1958 pack, but tuna is packed on a year-round basis.

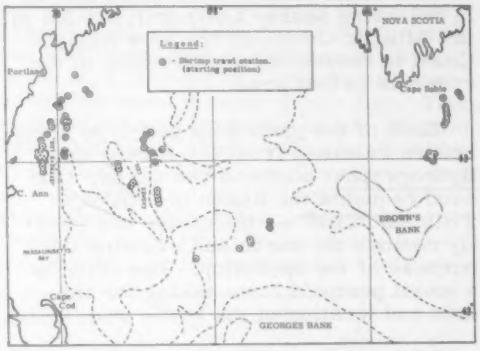
Imports of fresh and frozen fish and shellfish in the next several months will likely be close to the year-earlier high level, but those of canned fish may be lower. Exports of edible fishery products from the United States through mid-1960 will likely be smaller than in the same part of 1958/59 because of reduced supplies of canned salmon and California sardines (pilchards).

This analysis appeared in a report prepared by the Agricultural Marketing Service, U. S. Department of Agriculture, in cooperation with the Bureau of Commercial Fisheries, U. S. Department of the Interior, and published in the former agency's November 5, 1959, release of The National Food Situation (NFS-90).

North Atlantic Fisheries Exploration and Gear Research

GULF OF MAINE SHRIMP STOCKS SURVEYED:

M/V "Delaware" Cruise 59-11: Commercial concentrations of ocean pink shrimp (Pandalus borealis) were found in the deep water areas surveyed by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware in the Gulf of Maine.



M/V Delaware Cruise 59-11 (September 8-17, 1959).

During the September 8-17, 1959, cruise 71 drags were made in the Gulf and off Nova Scotia. The areas surveyed ranged in depth from 75 to 160 fathoms and included a number of mud-bottom basins. A standard 40-foot Gulf shrimp trawl was used as sampling gear on 66 of the exploratory tows. Five drags were made with a standard 100-foot Gulf shrimp trawl in the Jeffreys Ledge area. The most productive area was found to be west of Jeffreys Ledge in 90 to 105 fathoms where the best catch yielded 35 pounds of shrimp. The existence of a widely scattered shrimp population in the western part of the Gulf of Maine was indicated by small quantitites of shrimp in most of the drags. The shrimp averaged 34 per pound (heads on). A high percentage of the shrimp were egg-bearing females.

On several drags, small red crabs (Gervon sp.?) were abundant; collections of these and other fish and crustaceans (including shrimp) were made by Bureau personnel and cooperating scientists from Boston University.

Bottom temperatures were taken at selected stations. Drift bottles were released in cooperation with the Woods Hole Oceanographic Institution.

Ocean Currents

COAST AND GEODETIC SURVEY INITIATES STUDIES OFF NEW ENGLAND COAST:

The U. S. Coast and Geodetic Survey is releasing nearly 2,000 drift bottles in the Atlantic Ocean off the New England Coast to determine the direction of the currents in that area.

Each of the plain soda pop-type glass bottles released from the survey ship Hydrographer contains two cards. One card requests the finder to "BREAK THIS BOTTLE" so the finder can readily remove the cards and explains the purpose of the operation. The other is a small postpaid form asking for the date and location of the bottle when found.

All 2,000 bottles will be released from 10 to 35 miles offshore between the eastern tip of Long Island, N. Y., and Boston, Mass. They are part of a large-scale study of ocean currents and the date and place of release of each bottle will be on file at the Coast and Geodetic Survey's Washington office.

Survey officials hope to have a large percentage of the cards returned although some bottles may find their way via the Gulf Stream to the European side of the Atlantic. As an added incentive for the return of the cards, the finder will be told where the bottle he found originated. The card informs the finder, "You can add to the knowledge of ocean currents by returning the addressed card with the requested information. . . You will receive by return mail, information as to where this bottle was released. Your cooperation in giving accurate information will be of great assistance."

Oysters

LONG ISLAND SOUND SPAWNING AND SETTING OF OYSTERS AND STARFISH:

Observations on the occurrence and distribution of bivalve larvae, in general, and oyster larvae, in particular, have been continued. Contrary to the healthy condition of the oyster larvae reported previously, those collected on August 27 at one station were of dull color and looked unhealthy. Empty larval shells were also found in the plankton. The only mature larvae found on that date were at one station where there were four in a 200-gallon sample. At the station where the heaviest oyster setting was recorded at that time, no mature and only three immature straight-hinge larvae were observed. (Bulletin No. 5, dated September 11, of the Fishery Biological Laboratory of the U. S. Bureau of Commercial Fisheries, Milford, Conn.)

Since June 27, the number of larvae in the plankton samples has remained small. On September 3 only a few were found at two stations, while at one station there were only 24 bivalve larvae, of which none were oysters. In view of the heavy setting at the latter station at that time, the absence of oyster larvae in the samples seems peculiar. A possible explanation of this phenomenon is that the larvae are brought to this point by currents only for brief periods. A continuous collection of samples at the station during 24-hour periods may offer an explanation although, in the past, such attempts did not help much in clarifying the enigma.

The plankton samples collected on September 8 showed a comparatively large number of bivalve larvae at one station, although only one mature oyster larva was found there. In other areas bivalve larvae were not numerous and oyster larvae virtually absent.

It is clear that this year two stations in the Milford area seem to be receiving the heaviest sets. Unfortunately, because of a prevalence of starfish and drills, this section has been virtually abandoned and, as far as we know, no cultch to receive the new set has been planted there. However, because of the promising new chemical method for the control of starfish and drills, which is now under development at our laboratory, we hope to help the industry re-convert this area into productive seed oyster beds. Experiments along these lines have been carried on by the Bureau, some of them in close cooperation with the Connecticut Shell Fish Commission, for quite some time and the results will soon be reported. Several of the largest oyster companies of Connecticut and New York have also offered their cooperation in these studies.

Setting of starfish continues, but is extremely light. The young starfish that set earlier in the summer have grown in inshore areas to considerable size and are capable of attacking the oysters of last year's set, but in Long Island Sound proper, probably because of a lack of food, many of the starfish appear emaciated.

South Atlantic Exploratory Fishery Program

EXPLORATORY SURVEYS FOR NEW FISHERY RESOURCES INITIATED: A search for new fishing grounds and for species of commercially-valuable fish and shellfish along the South Atlantic coast between North Carolina and Florida was started on August 31, 1959. This is a part of the U. S. Bureau of Commercial Fisheries program of charting potential marine resources as a means of insuring continuous supplies of fishery products.

The project now under way was endorsed for several years by the Atlantic States Marine Fisheries Commission. It has finally materialized through an allocation of about $150,000 for this fiscal year (1960) from funds provided by the Saltonstall-Kennedy Act of 1954, as amended by the Fish and Wildlife Act of 1956.

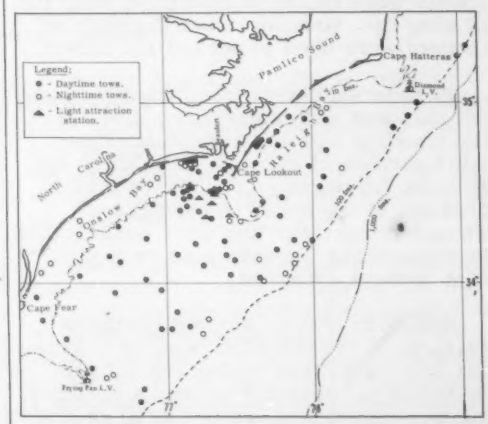
The exploratory fishing vessel Silver Bay, a 96-foot steel-hulled New England-type trawler equipped with modern electronic navigational and fish-detecting devices, is being used in the survey. The vessel, transferred from the Gulf of Mexico after a two-year red snapper trawling survey, will be based at Brunswick, Ga., for the duration of the program. Brunswick was chosen as a base of operations due to its central geographical position, deep-water port facilities, convenience of cooperation with the Bureau's Fishery Biological Laboratory there, and the resultant savings that can be expected through joint administrative services.

In formulating the operational program, the immediate needs of the commercial fishing industry in those areas have been taken into consideration. Exploratory operations for the present will place primary emphasis on a 5-50 fathom depth range. The cruises will be arranged, insofar as possible, to permit seasonal coverage for all areas. Special effort will be made to determine the availability of shrimp and fish steaks beyond the range of present fishing.

A staff of 3 fishery exploration specialists and 9 skilled fishermen man the vessel. General program and operational supervision is by the Chief, Gulf Fisheries Exploration and Gear Research Section, Bureau of Commercial Fisheries, Pascagoula, Miss.

* * * * *

CONTINENTAL SHELF OFF NORTH CAROLINA COAST SURVEYED: M/V "Silver Bay" Cruise 18: A 29-day exploratory trawl survey of the continental shelf off the coast of North Carolina was completed on October 2, 1959, by the U. S. Bureau of Commercial Fisheries chartered trawler Silver Bay. This work, which was proposed by the Atlantic States Marine Fisheries Commission, is a continuation of the East Coast exploratory program that was initiated in 1957 and is designed to gather additional information concerning the offshore fishery potential of the continental shelf be-



M/V Silver Bay Cruise 18 (August 31-September 25, 1959).

tween Cape Hatteras, N. C., and Cape Canaveral, Fla. The exploratory operation is temporarily based at Brunswick, Ga., to coordinate the exploratory work with the oceanographic research that has been in progress for the past five years at the Bureau's Brunswick Biological Laboratory.

During the trawl survey, 76 day and 33 night exploratory tows were completed

in the 5- to 100-fathom depth range between Cape Hatteras and Cape Fear, N. C. Major effort was expended in the 5-50 fathom depth range between Cape Lookout and Cape Fear at the request of the North Carolina Fisheries Association. Six night-light attraction stations were completed between Cape Lookout and Cape Fear.

Trawling operations were conducted with both shrimp and fish trawls rigged with chain and/or rollers on the foot rope, and fished with standard V-D bridles and ground cables. Tickler chains were used whenever bottom conditions permitted. The shrimp trawls were constructed from 2-inch stretched mesh webbing throughout the body and cod end, and with few exceptions were fished with loop-chain foot rope. The fish trawls were constructed from $4\frac{1}{2}$-inch stretched mesh webbing in the frame and body and 2-inch webbing in the 150-mesh extension and cod end. The fish trawls were roller-rigged from wing tip to wing tip. Bracket doors (8 feet x 46 inches) were used to spread the trawls.

In general, bottom conditions throughout the area were found to be suitable for trawling with the exception of isolated patches of coral, which though not suitable for shrimp gear, presented no problem to the roller-rigged gear. Though minor tear-ups were experienced in some areas, no gear loss or significant damage occurred.

SHRIMP: Brown shrimp (Penaeus aztecus, 21-25 count) were taken in both day and night tows in the 5-8 fathom depth range between Beaufort and Bogue Inlets. Individual tows in this area produced between 5 and 35 pounds of heads-off shrimp per hour. Only scattered individuals were taken west of Bogue Inlet in this depth range. Approximately 45 tows completed in the 10-50 fathom depth range between Cape Fear and Cape Lookout failed to produce catches of brown shrimp.

Large pink shrimp (Penaeus duroarum, 15-20 count) were caught between Beaufort Inlet and Cape Lookout in the 6-10 fathom depth range, but none were taken beyond the 10-fathom curve. Brown and pink shrimp were notably absent from all tows east of Cape Lookout. Night-light attraction stations failed to attract concentrations of shrimp or fish.

Though rock shrimp (Sicyonia sp.) were present in nearly all tows no catches of commercial importance were made.

The results of this phase of the survey strongly suggests that no fishable concentrations of shrimp are to be found beyond the range of the existing fishery during this season.

FISH: Moderate to heavy concentrations of fish consisting mainly of small spot (Leiostomus xanthurus), croakers (Micropogon undulatus), porgy (Stenotomus sp.), and butterfish (Poronotus tricanthus) were located in widely separated areas. Exploratory tows in the 5-12 fathom depth range between Cape Lookout and Cape Fear produced mixed catches of fish at the rate of 2,000-3,000 pounds per one-hour tow. Beyond the 12-fathom curve, production of fish ranged from less than 100 pounds to a maximum of 600 pounds per hour tow.

Between Cape Lookout and Cape Hatteras moderate catches of small-market fish or noncommercial varieties of fish (up to 1,000 pounds per hour) were taken in depths ranging from 10 to 30 fathoms.

Moderate to heavy concentrations of small butterfish were located at 35°20' N. and 74°56' W. in 85 to 105 fathoms. One tow of less than one hour with the $4\frac{1}{2}$-inch mesh fish trawl resulted in a catch of 1,800 pounds of butterfish. Fair catches of squid (Loligo pealii, up to 500 pounds per hour) also were taken in this area in 75 to 95 fathoms. Some difficulty was experienced in working this area due to the extremely steep slope of the shelf.

SCALLOPS: Of special interest was the discovery of large calico scallops (Pecten gibbus) in 17 to 20 fathoms southeast of Core Banks. From 1-3 bushels of these scallops were taken in shrimp trawls. The scallops, which measured approximately 3 inches across the shell, yielded approximately $2\frac{1}{2}$ quarts of meats per bushel. Taste and texture were excellent and compare favorably with the bay scallop (Pecten irradians). No attempt was made to define the extent of

the bed due to the lack of suitable gear. Modified "George's Bank" type scallop dredges will be used on the next cruise in this area to determine the commercial potential.

OTHER FINDINGS: In many areas the vessel's fish finder indicated heavy concentrations of bottom fish. However, trawl sets made on these indications suggested that the traces were made by dense schools of small anchovies (Anchoa sp.) too small to be caught in significant quantities with the existing gear.

Numerous schools of surface fish were observed almost daily and were tentatively identified as thread herring (Opisthonema oglinum) and menhaden (Brevoortia sp.).

Surface trolling was conducted at intervals between stations and resulted in the capture of six "false albacore" (Euthynnus alletteratus) and one white skipjack (Katsuwonus pelamis).

Heavy ground swells preceding Hurricane "Gracie" interrupted the cruise plan and precluded any attempt at surveying the broken bottom area where red snapper were discovered by the research vessel Delaware in February 1958.

South Carolina

FISHERIES BIOLOGICAL RESEARCH PROGRESS, JULY-SEPTEMBER 1959:

Leased Seed Oyster Areas Surveyed: Because of the increased importance of seed oysters, field surveys of three areas in polluted grounds leased from the State for the production of seed oysters was made during this quarter. An area of 45 acres in Jasper and Beaufort Counties on the New and Wright Rivers was examined in mid-August. As yet the lessee has made no attempt to plant cultch for seed oyster production. The area seems well suited for this purpose. At present there are less than 10,000 bushels of oysters within the area.

Another seed lease in the Stono River area (Charleston County) was surveyed. This area is about in the same general condition as the above. It is capable of producing seed oysters, but there are relatively few in the area now. Intensive cultivation is needed for seed production.

The third area, on the edge of Charleston Harbor, was examined during the latter part of August. Here some 400 bushels of seed had been grown on cultch in wire baskets in June and July. In this 50-acre lease the extent of seed oyster production is limited only by the amount of cultch which can be placed overboard. About 200 bushels of large oysters were removed from this area in September for replanting under special permission of the State Health Department.

There are other seed oyster leases yet to be surveyed. More and more polluted grounds and bottoms which have not been in commercial production of oysters are being leased for seed production. Five oystermen, new to the oyster business in South Carolina, have now either leased or have applied to lease seed oyster grounds.

Shrimp Research: The 50 regular trawl hauls made during July-September 1959 indicated that brown shrimp were only slightly less abundant than during the same period of 1958. White shrimp, on the other hand, were just about twice as numerous.

Under the new Coastal Fisheries Laws which went into effect in May 1959, the Chairman of the Wildlife Resources Commission, on recommendation of Bears Bluff Laboratories, was given greater authority in opening and closing certain sounds and inland waters to shrimp fishing. As a result, from early July through mid-August, the Laboratories' 40-foot survey boat and its crew were constantly busy checking the size of shrimp in those areas. Consequently, three large sounds in South Carolina which ordinarily would not have been opened to shrimp fishing until August 15, were opened 19 days earlier.

Continuous reinspection of the sounds and inland waters indicated that St. Helena Sound needed to be closed again 14 days later because the large shrimp had disappeared and the shrimp in the sound

were generally too small to be marketed profitably.

This opening and closing of restricted areas after studies made by Bears Bluff Laboratories is a step in the direction of good fisheries management, but because of the large areas involved, the considerable distances to be traveled by the research vessel, and the small staff, it imposes considerable strain on the Laboratory in order to keep abreast of this and its other work.

Crab Research: In August, two biologists from the U. S. Bureau of Commercial Fisheries at Beaufort, N. C., together with personnel and crew of Bears Bluff Laboratories, tagged 973 blue crabs in the vicinities of Charleston Harbor and the North Edisto River. As of mid-September only 12 tags had been returned; all from nearby the area of release. Perhaps the lapse of more time will indicate whether the movement of blue crabs in summer is different from that observed in the winter by this Federal-State cooperative tagging program.

Pond Culture: Two experiments being carried out in the salt-water ponds were terminated suddenly on the morning of September 29 when Hurricane Gracie produced tides sufficiently high to completely sweep over the pond dikes. Although there was no structural damage, it will be impossible to tell whether the shrimp and fish in the pond came in or washed out with these hurricane tides.

Sponges

NATURAL SPONGE INDUSTRY TO BE FEATURED IN FILM:

The signing of a contract with the Sponge and Chamois Institute for the production of an industry-sponsored sound-color film which will feature the United States natural sponge industry was announced October 8, 1959, by the U. S. Department of the Interior.

The contract provides that the Bureau of Commercial Fisheries, Fish and Wildlife Service, will produce and distribute the film. Tarpon Springs, Fla., home of the natural sponge industry in the United States, will be the locale of the picture.

Tarpon Springs is a community of Greek-American sponge fishermen. It is rich in the tradition of an old and colorful industry. Filming will start on Epiphany, the day upon which the sponge season traditionally opens with religious and festive ceremonies. Scenes will include sponge divers in action, underwater shots of the sponge colonies, and the picturesque wholesale sponge market. The picture will be 14 minutes in length and will be available on a free loan basis. The production is being financed by the natural sponge industry.

The natural sponge has several specialized uses. About one fourth of the output is used by the pottery industry. Professional painters, decorators, and cleaners use about half of the annual production. Householders and various amateur users take the rest.

The industry was established in Tarpon Springs in 1849. Its peak production was 486,000 pounds in 1936. A blight which started in 1938 and which persisted for a number of years all but ruined the resource. In recent years sponge production has been increasing.

Standards

PROPOSED STANDARDS FOR FROZEN RAW HEADLESS SHRIMP REVIEWED AT MEETINGS:

Four open meetings were scheduled in October and November for full discussion of possible grade standards for frozen raw headless shrimp. The National Fisheries Institute Technology Division arranged these meetings in order to assure expeditious development of practical standards through effective industry-government cooperation. On the basis of its recent canvass of the industry, the Technology Division recommended to the U. S. Bureau of Commercial Fisheries that an attempt be made to develop these standards. Bureau technologists compiled a first draft for consideration by the industry. The use of the standards

for grading samples of frozen shrimp were to be demonstrated at the meetings.

U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, AUGUST 1959:

Imports of edible fresh, frozen, and processed fish and shellfish into the United States during August 1959 decreased by 8.0 percent in quantity and 16.3 percent in value as compared with July 1959. The decrease was due primarily to lower imports of groundfish fillets (down 6.5 million pounds), frozen other tuna (down 3.3 million pounds), frozen shrimp (down 2.8 million pounds), and lobsters (down 2.9 million pounds), and to a lesser degree, a decrease in the imports of canned tuna in brine and fresh and frozen salmon. The decrease was partly offset by a 2.4-million-pound increase in the imports of frozen albacore tuna and other fillets (up 0.4 million pounds).

United States Foreign Trade in Edible Fishery Products, August 1959 with Comparisons

Item	Quantity			Value		
	August		Year	August		Year
	1959	1958	1958	1959	1958	1958
	(Millions of Lbs.)			(Millions of $)		
Imports:						
Fish & shellfish:						
Fresh, frozen, & processed 1/ . . .	85.9	91.0	956.8	22.6	25.2	278.4
Exports:						
Fish & shellfish:						
Processed only 1/ (excluding fresh & frozen)	4.6	2.5	41.2	1.6	0.9	15.6

1/Includes pastes, sauces, clam chowder and juice, and other specialties.

Compared with August 1958, the imports in August this year were down by 5.6 percent in quantity and 10.3 percent in value due to lower imports of frozen albacore and other tuna (down 7.4 million pounds), fresh and frozen salmon (down 3.0 million pounds), and frozen shrimp (down 1.5 million pounds). Compensating, in part, for the decreases was an increase of about 1.4 million pounds in the imports of fillets other than groundfish and canned salmon (up 0.6 million pounds).

United States exports of processed fish and shellfish in August 1959 were lower by 26.9 percent in quantity, but higher by 14.3 percent in value as compared with July 1959. Compared with the same month in 1958, the exports this August were higher by 85.1 percent in quantity and 77.8 percent in value. The higher exports in August this year as compared with the same month in 1958 were due to better stocks of California sardines available for export to foreign markets.

* * * * *

GROUNDFISH FILLET IMPORTS, SEPTEMBER 1959:

During September 1959, imports of groundfish (including ocean perch), classified as fillets, into the United States amounted to 6.3 million pounds, according to data obtained from the U. S. Bureau of Customs and published by the Bureau of Commercial Fisheries. However, since September 15, 1959, fish fillet blocks are being classified under a different category and are not included with the fillets as previously. Thus imports including fish blocks would be much higher in September 1959, but exact data won't be available until later.

During the first nine months of 1959, total imports of groundfish and ocean perch classified as fillets (but not including fish fillet blocks since September 15) into the United States totaled 126.1 million pounds.

Note: See Chart 7 of this issue.

* * * * *

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1959 at the 12½-percent rate of duty is 52,372,574 pounds. Any imports in excess of the quota will be dutiable at 25 percent ad-valorem.

Imports from January 1-October 31, 1959, amounted to 43,114,352 pounds, according to data compiled by the Bureau of Customs. January 1-October 31, 1958, a total of 42,349,036 pounds had been im-

ported. The quota for 1958 of 44,693,874 pounds was reached on November 20, 1958.

U. S. Production of Fish Sticks and Portions, July-September 1959

The United States production of fish sticks in the third quarter of 1959 was 13.0 million pounds and fish portions totaled 8.6 million pounds. This was a drop of 1.3 million pounds, or 9 percent, in fish sticks, but a gain of 3.4 million pounds, or 65 percent, in portions as compared with the same quarter of the previous year.

Cooked fish sticks (11.8 million pounds) made up 91 percent of the total fish-stick production. The remaining 1.2 million pounds, or 9 percent, consisted of raw fish sticks. A total of 8.2 million pounds of breaded fish portions (of which 7.1 million pounds were raw) and nearly 0.5 million pounds of unbreaded portions was processed during the third quarter of 1959.

The Atlantic Coast was the principal area in the production of both fish sticks and portions with 10.8 and 4.4 million pounds, respectively.

During the first nine months of 1959, a total of 45.0 million pounds of fish sticks was produced--an increase of less than 1 percent as compared with the corresponding period of 1958. Fish portions (26.1 million pounds) were up 72 percent over the nine-months period of 1958.

Table 1 - U. S. Production of Fish Sticks by Months, July-September 1959[1/]

Month	Cooked	Raw	Total
	(1,000 Lbs.)		
July	3,477	292	3,769
August	3,560	295	3,855
September	4,752	592	5,344
Total 3rd. quarter 1959	11,789	1,179	12,968
Total 3rd. quarter 1958	12,855	1,405	14,260
Total first 9 months 1959	41,223	3,758	44,981
Total first 9 months 1958	40,766	4,202	44,968

1/Preliminary.

Table 2 - U. S. Production of Fish Sticks by Areas, July-September 1958 and 1959

Area	1959[1/]		1958[2/]	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	24	10,812	21	11,329
Interior and Gulf States	6	1,216	4	1,704
Pacific Coast States	9	940	11	1,227
Total	39	12,968	36	14,260

1/Preliminary.
2/Revised.

Table 3 - U. S. Production of Fish Sticks by Months, 1955-1959

Month	1959[1/]	1958[2/]	1957	1956	1955
			(1,000 Lbs.)		
January	6,316	5,471	4,261	4,862	5,345
February	6,394	5,925	5,246	5,323	5,794
March	5,622	5,526	5,147	6,082	7,205
April	4,708	4,855	4,492	3,771	5,953
May	4,398	4,229	3,380	3,873	4,879
June	4,575	4,702	3,522	3,580	5,392
July	3,769	4,574	3,821	3,153	4,340
August	3,855	4,358	4,643	4,166	4,520
September	5,344	5,328	4,861	4,085	4,535
October	-	5,485	5,162	5,063	5,261
November	-	5,091	4,579	4,585	4,946
December	-	5,359	4,014	4,019	4,876
Total	-	60,903	53,128	52,562	63,046

1/Preliminary. 2/Revised.

Table 4 - U. S. Production of Fish Portions by Months and Type, July-September 1959[1/]

Month	Breaded			Unbreaded	Total
	Cooked	Raw	Total		
			(1,000 Lbs.)		
July	216	1,903	2,119	127	2,246
August	291	2,353	2,644	171	2,815
September	593	2,808	3,401	182	3,583
Total 3rd. quarter 1959	1,100	7,064	8,164	480	8,644
Total 3rd. quarter 1958	754	4,085	4,839	403	5,242
Total first 9 months 1959	3,731	20,530	24,261	1,851	26,112
Total first 9 months 1958	2,472	11,330	13,802	1,389	15,191

1/Preliminary.

Table 5 - U. S. Production of Fish Portions by Areas, July-September, 1958 and 1959

Area	1959[1/]		1958	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	23	4,398	15	2,902
Interior, Gulf, and Pacific Coast States	12	4,246	7	2,340
Total	35	8,644	22	5,242

1/Preliminary.

Table 6 - U. S. Production of Fish Portions by Months, 1958-1959

Month	1959 1/	1958
	(1,000 Lbs.)	
January	2,665	1,973
February	2,996	1,254
March	3,203	1,471
April	2,627	2,268
May	2,706	1,478
June	3,271	1,504
July	2,246	2,161
August	2,815	1,516
September	3,583	1,566
October	-	2,560
November	-	1,979
December	-	2,060
Total	-	21,790

1/Preliminary.

United States Fishery Landings, January-August 1959

Landings of fish and shellfish in the United States during the first eight months of 1959 were 11 percent higher than for the same period of 1958.

Menhaden landings, following the upward pattern of the preceding month, accounted for the greater production with an increase of 510 million pounds. Landings of Alaska herring also showed an increase which, with the season over, totaled 110 million pounds--a gain of more than 21 million pounds. Among the food fishes, shrimp landings for the first eight months of 1959 were up over 11 million pounds in the South Atlantic and Gulf States. In New England, the catch of whiting increased by 7 million pounds.

Alaska salmon landings declined considerably (down 99 million pounds) with the fishing season past its peak. Tuna landings dropped 37 million pounds below the same period of 1958--due largely to the tie-up of the tuna fleet. Landings of Pacific sardines since the opening of the season on August 1 totaled only 10 million pounds, due mainly to a price dispute in Southern California. Over 76 million pounds of Pacific sardines were taken by September 30, 1958. Ocean perch landings in New England and Maine herring were down 13 million pounds and 11 million pounds, respectively. The production of industrial fish

Table 1 - United States Fishery Landings of Certain Species for Periods Shown, 1959 and 1958 1/

Species	Period	1959	1958	Total 1958
		(1,000 lbs.)		
Anchovies, Calif.	8 mos.	2,000	6,072	8,148
Cod:				
Maine	7 mos.	2,100	2,191	2,735
Boston	8 "	12,700	11,829	16,183
Gloucester	8 "	2,200	2,198	3,189
Total cod		17,000	16,218	22,107
Haddock:				
Maine	7 mos.	2,100	2,666	3,997
Boston	8 "	52,400	64,616	81,509
Gloucester	8 "	10,200	7,986	9,798
Total haddock		64,700	75,268	95,304
Halibut 2/:				
Wash. and Oreg.	8 mos.	16,200	13,758	16,200
Alaska	8 "	20,400	18,159	19,814
Total halibut		36,600	31,917	36,014
Herring:				
Maine	7 mos.	60,400	71,607	170,977
Alaska (season over)	8 "	110,000	88,801	88,801
Industrial Fish, Maine & Mass. 3/	8 mos.	72,900	89,300	108,869
Mackerel, Calif.:				
Jack	8 mos.	15,800	8,364	21,698
Pacific	8 "	12,800	12,984	24,624
Menhaden	8 mos.	1,528,240	1,018,421	1,544,700
Ocean perch:				
Maine	7 mos.	43,400	44,549	71,068
Boston	8 "	1,900	1,632	2,625
Gloucester	8 "	41,300	53,786	74,951
Total ocean perch		86,600	99,967	148,644
Salmon:				
Wash. 4/	8 mos.	24,500	20,213	54,363
Oreg. 4/	6 "	2,100	3,418	8,179
Alaska	8 "	134,500	233,176	241,255
Sardines, Pacific	9 mos.	10,500	76,100	207,429
Scallops, sea, New Bedford (meats)	8 mos.	12,300	10,679	15,253
Shrimp (heads-on):				
South Atl. & Gulf	8 mos.	118,400	107,100	195,808
Washington	8 "	2,000	5,911	6,730
Oregon	6 "	1,900	1,268	1,523
Alaska	8 "	9,500	4,856	7,862
Squid, Calif.	7 mos.	15,500	3,974	4,864
Tuna, Calif.	to Sept. 19	217,500	254,156	307,378
Whiting:				
Maine	7 mos.	18,300	20,551	23,577
Boston	8 "	500	243	596
Gloucester	8 "	45,100	35,851	58,927
Total whiting		63,900	56,645	83,100
Total of all above items		2,619,640	2,296,415	3,403,630
Others (not listed)		427,360	439,262	1,312,370
Grand total		3,047,000	2,735,677	4,716,000

1/Preliminary.
2/Dressed weight.
3/Excluding menhaden
4/Landed weight.

in that area decreased by 16 million pounds, compared with the first eight months of 1958.

Table 2 - United States Fishery Landings by States for Periods Shown, 1959 and 1958 1/

Area	Period	1959	1958	Total 1958
		(1,000 lbs.)		
Maine	7 mos.	146,100	162,122	316,955
Massachusetts 2/:				
Boston	8 mos.	78,500	91,839	123,764
Gloucester	8 "	162,500	153,564	230,218
New Bedford	8 "	78,100	80,541	111,669
Provincetown	8 "	17,100	14,100	25,754
Total Mass.		336,200	340,044	491,405
Rhode Island 3/	7 mos.	73,200	61,089	103,452
New York 3/	7 "	23,000	24,800	42,063
New Jersey 3/	8 "	37,800	32,777	50,933
North Carolina 3/	8 "	41,700	40,849	54,866
South Carolina 3/	8 "	8,800	9,409	15,359
Georgia	8 "	11,900	11,612	20,066
Florida 3/	8 "	85,300	95,073	158,724
Alabama	7 "	7,700	5,395	10,343
Mississippi 3/	7 "	10,600	8,002	82,476
Louisiana 3/	5 "	24,600	28,800	75,237
Texas 3/	7 "	26,400	27,324	80,478
Ohio (Mar.-June)	6 "	12,200	12,029	19,145
Oregon 2/	6 "	19,700	26,645	59,467
Washington 2/	8 "	98,000	92,506	164,987
California:				
Certain species 4/	8 mos.	274,100	361,650	581,199
Other	5 "	35,600	35,931	82,709
Total Calif.		309,700	397,581	663,908
Rhode Island, Middle Atlantic, Chesapeake, South Atlantic, and Gulf States (menhaden only)	8 mos.	1,499,700	1,014,628	1,540,867
Alaska:				
Halibut 5/	8 mos.	20,400	18,159	19,814
Herring (season over)	8 "	110,000	88,801	88,801
Salmon	8 "	134,500	233,176	241,255
Shrimp	8 "	9,500	4,856	7,862
Total of all above items		3,047,000	2,735,677	4,308,463
Others (not listed)		6/	6/	407,537
Grand total		6/	6/	4,716,000

1/Preliminary.
2/Landed weight.
3/Excluding menhaden.
4/Includes catch of anchovies, jack and Pacific mackerel, Pacific sardines, squid, and tuna. Data on tuna are for the season to September 19; data on squid are for first seven months.
5/Dressed weight.
6/Data not available.
Note: Data principally represent weight of fish and shellfish as landed except for mollusks which represent the weight of meats only.

Wholesale Prices, October 1959

The October 1959 wholesale price index (121.1 percent of the 1947-49 average) for edible fishery products (fresh, frozen, and canned) was down slightly (0.4 percent) from September 1959 because of lower prices for drawn large haddock and fresh and frozen shrimp. But compared to October a year ago, a more substantial decline of 6.6 percent occurred due to lower prices for 10 out of the 17 items making up the edible fishery products index. This year supplies have been more plentiful and normal while last year they were light and below normal.

Due to a temporary improvement in the landings of large drawn haddock at Boston during mid-October 1959, good supplies of frozen halibut, and a slight improvement in Great Lakes yellow pike supplies, the October 1959 drawn, dressed, and whole finfish subgroup price index dropped 3.8 percent from September. But fresh-water whitefish prices were higher. Compared to October a year ago, this October there were price declines of 14.2 percent for large haddock, 7.3 percent for frozen dressed halibut, and 3.0 percent for fresh and frozen king salmon which resulted in a drop of 4.0 percent in the subgroup index. These declines were only partially offset by higher wholesale prices for the fresh-water items.

Fresh processed fish and shellfish prices in mid-October 1959 were up by 3.7 percent from the preceding month. Higher prices for fresh small haddock fillets (up 23.2 percent) and fresh shucked oysters (up 10.2 percent) offset a drop of 6.1 percent in prices for fresh headless shrimp. From October last year to October 1959 the fresh processed fish and shellfish subgroup index dropped 8.5 percent. Lower prices for fresh small haddock fillets (down 15.0 percent) and fresh headless shrimp (down by 24.7 percent) more than offset an increase of 12.5 percent in fresh oyster prices. East Coast oyster supplies were short during the 1958/59 season and this shortage is even more pronounced as the 1959/60 season entered into full swing this October.

Changes in the wholesale price index for processed frozen fish and shellfish from September to October this year were slight (down only 0.7 percent). An increase of about 1 cent a pound in frozen flounder fillet prices failed to overcome a further drop of 2.8 percent in frozen headless shrimp prices at Chicago. Prices for frozen haddock fillets and ocean perch fillets remained unchanged. The drop in the price index for this subgroup from October 1958 to October 1959 was sharper (20.1 percent). Declines in frozen fillet prices ranged from 19.7 percent for haddock fillets, 9.9 percent for ocean perch fillets, and 8.4 percent for flounder fillets. The sharpest drop occurred in the frozen headless shrimp price, which was down 25.8 percent. More imports, generally larger domestic landings, and substantial inventories were responsible for the sharp drop in prices from October 1958 to this October.

Canned fish prices in October 1959 were unchanged from the preceding month. The packing season for Maine sardines and West Coast salmon was about over by the end of the month with a sharply lower pack of canned salmon and about a 10-percent smaller pack for Maine sardines. As of October 29 the estimated pack of California sardines was only 533,920 cases (48 1-lb. cans) a drop of 71.4 percent from the 1,883,720 cases packed to that date in 1958. Tuna canning began to pick up in October following several months of tie-ups because of disputes over ex-vessel prices at California producing and canning centers. The 1959 pack of canned tuna will be high, but not up to the record set in 1958. The October 1959 canned fish price index was up about 1.6 percent from October a year ago because available supplies were lighter. Canned salmon (up 12.6 percent) and canned Maine sardines (up 6.4 percent) more than compensated for price drops of 9.6 percent for California tuna and 12.3 percent for California sardines.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, October 1959 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1947-49=100)			
			Oct. 1959	Sept. 1959	Oct. 1959	Sept. 1959	Aug. 1959	Oct. 1958
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					121.1	2/121.6	119.8	129.6
Fresh & Frozen Fishery Products:					134.0	2/134.8	132.8	149.2
Drawn, Dressed, or Whole Finfish:					153.8	159.9	152.2	160.2
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.13	.15	127.9	153.1	109.1	149.0
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.32	.33	98.5	101.1	107.8	106.2
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.79	.80	177.2	179.7	179.7	182.6
Whitefish,L. Superior, drawn, fresh	Chicago	lb.	.75	.73	185.9	179.7	158.6	161.1
Whitefish,L. Erie pound or gill net, rnd., fresh	New York	lb.	1.00	.73	202.3	146.7	161.8	182.0
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.69	.73	161.8	170.0	193.5	138.4
Processed,Fresh (Fish & Shellfish):					128.9	2/124.3	121.5	140.8
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.43	.35	144.6	117.4	125.9	170.1
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.63	.67	98.7	105.1	101.1	131.1
Oysters, shucked, standards	Norfolk	gal.	6.75	6.25	167.1	2/151.6	148.5	148.5
Processed, Frozen (Fish & Shellfish):					106.4	107.2	112.3	133.1
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.38	.37	99.5	96.8	98.2	108.6
Haddock, sml.,skins on, 1-lb. pkg.	Boston	lb.	.33	.33	102.0	102.0	102.0	127.1
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.27	.27	108.8	108.8	108.8	120.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.62	.64	95.3	98.0	106.5	128.5
Canned Fishery Products:					103.4	103.4	102.0	101.8
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	24.50	24.50	127.8	127.8	123.9	113.5
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	10.80	10.80	77.9	77.9	77.9	86.2
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	7.50	7.50	88.1	88.1	88.1	100.4
Sardines, Maine, keyless oil, No. 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	8.75	8.75	93.1	93.1	93.1	87.5

1/ Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.
2/ Revised.

METHOD FOR DETERMINING FRESHNESS OF FISH

A method for determining the freshness of sea fish based on the determination of volatile, permanganate-reducing substances in fish, is stated to be independent of the variety of fish and easily done on whole fish, and fresh or frozen fillets. Air is passed through 5 ml. of test fish pulp, through a safety trap, and into an absorption flask containing either 10 or 20 ml. of 0.02N $KMnO_4$ in 1N NaOH. A 2 ml. aliquot, to which has been added 1 ml. 6N H_2SO_4 and 0.6 ml. 20 percent KI in 0.1N Na_2CO_3 is titrated with 0.00025N $Na_2S_2O_3$ to a starch indicator end point. The following microequivalents were found: 0 in freshly killed fish, 0 to 10 in fresh fish, 10 to 20 for those with first observable changes in quality, greater than 20 for those starting decomposition, and greater than 30 for those showing putrefaction (Die Fischwaren und Feinkostindustrie, April 1958).

FOREIGN

International

FOOD AND AGRICULTURE ORGANIZATION

FISHERY STATISTICS TRAINING CENTER HELD IN DENMARK:

Twenty government officials from 14 countries and territories attended the International Training Center in Fishery Statistics, organized by the Food and Agriculture Organization (FAO), Rome, Italy, and held in Copenhagen, Denmark, at the invitation of the Danish Government. The following countries attended the Center: Ethiopia, Ghana, Greece, Iran, Lebanon, Liberia, Morocco, Nigeria, Pakistan, Turkey, British overseas territories (Malta, N. and S. Rhodesia, Uganda), and Yugoslavia.

The Training Center was particularly designed for those who are immediately responsible for the collection and collation of primary fishery statistics. Holding the Center in Copenhagen was especially advantageous because Denmark has a highly developed fishing industry and the Government Statistical Services are very well organized and efficient, thus providing excellent facilities for study.

During the five-week course, the participants attended lectures and demonstrations on organization, methods, practical application, and evaluation of fishery statistics.

Seminars were an important feature of the Center at which individual participants introduced and discussed reports on the present organization of fishery statistics in their own country, with special reference to improvements which could be effected in the light of information gathered at the Center.

After two weeks in Copenhagen, the participants moved to Hutshels, a fishing port in North Jutland, where they took part in the collection of statistical data and also got an insight into fishing methods, landings, gear, etc.

Denmark is particularly well suited for field work of this nature because the fishing industry is based on a large number of small, owner-operated craft, using a wide variety of fishing gear, based on widely scattered fishing ports of all sizes. The rapidly-developing fisheries in the participating countries are facing problems of statistical design and management similar to those faced, and successfully solved, in Denmark for the last 40 years.

* * * * *

FISHERIES SURVEYS TRAINING CENTER HELD IN TANGANYIKA:

A Training Center on Fisheries Surveys for the countries in the African region, organized by the Food and Agriculture Organization (FAO), was held at Tanga, Tanganyika, from November 9-December 18, 1959.

The Center was directed by the Fisheries Officer of Tanganyika and a professor from the University of Washington in Seattle, U. S. A., acted as Associate Director. A number of FAO officers participated in both the theoretical and practical work of the Center. These included a fisheries biologist from the headquarters staff, a marketing expert on assignment in Ghana, an expert on assignment as fisheries biologist in Uganda, and a member

International (Contd.):

of the Japanese Ministry of Agriculture and Forestry who lectured at the Indian Fisheries Statistics Training Center held earlier this year in Bombay.

The Training Center was concerned with the objectives, methods, and uses of surveys in all phases of fish production, processing, and distribution.

Apart from the lectures, the participants at the Center made field trips which were used to illustrate the instruction given in the classroom. In addition, the special problems of the fisheries in the African region were discussed in seminars.

Participants at the Training Center came from all parts of Africa and included not only students from independent African countries, but also from territories and dependencies.

* * * * *

SARDINE MEETING CALLS FOR INTERNATIONAL COOPERATION IN RESEARCH:

Nine general recommendations to promote rapid international exchange of information and data obtained from research and other work on sardine problems were made in the final report of the World Scientific Meeting on the Biology of Sardines and Related Species, which was held in Rome, Italy, from September 14-21, 1959.

The meeting, convened by the Food and Agriculture Organization (FAO) at its Rome headquarters, was attended by more than 50 experts from 26 countries. Some 60 scientific papers were presented.

The objectives of the meeting were to appraise the status of knowledge on the biology of sardines, assess present methods of research and indicate the lines along which national and international action might be developed to improve research programs.

The nine general recommendations of the meeting call for FAO leadership in promoting international cooperation in dealing with sardine problems. Specifically the scientists asked FAO to publish an annotated bibliography on sardine research, a directory of sardine research institutions, and strengthen the work of producing synopses on species of sardines and other fishes of economic value.

The meeting also called on FAO to convene "follow-up meetings on the biology of sardines" and on other species "for which major fisheries exist," promote standardization of routine methods used in research programs, encourage exchange visits between scientists and focus attention on the need to improve specialized research on sardines.

A section of the report dealing with "Perspectives in Sardine Research" focuses attention on a number of special problems and indicates the lines of approach that should be adopted. These include more extensive and intensive use of modern techniques and a more comprehensive approach to the various aspects of the sardine problems.

The commercial importance of sardines and the continuing fluctuations in sardine stocks, resulting in severe economic losses for fishermen, attracted world attention to the meeting. There were participants from most of the countries concerned with sardine fisheries and observers from non-government and commercial organizations. At the conclusion of the meeting the participants took the unusual action of passing a resolution to thank FAO for convening and running the meeting which had been, the resolution stated, "a universal success."

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

SIXTH ANNUAL MEETING HELD IN SEATTLE:

Fisheries administrators and experts from Canada, Japan, and the United States met in Seattle, Wash., in October for intensive discussion of fisheries problems in the North Pacific Ocean. The sixth annual meeting of the International North Pacific Fisheries Commission was opened by the Chairman of the Commission on October 19.

International (Contd.):

The Commission, established by treaty between the member Governments, conducts research and makes recommendations on fishery conservation problems on stocks of fish of joint interest throughout the high-seas areas of the North Pacific Ocean.

At the meeting the Commission received reports from many scientists on the latest results of a large-scale research program which is studying the distribution, abundance, and movements of salmon from the Asian and North American continents on the high seas. In addition, the Commission studied the conditions of utilization and conservation of North American salmon, herring, and halibut stocks to determine whether or not Japan, and in some cases, Canada, should continue to refrain from fishing such stocks. Abstention from fishing is effective in the eastern portion of the North Pacific and in the eastern Bering Sea. In the case of salmon on the high seas, Japan abstains from fishing east of a line along the meridian of 175° west longitude, which passes near Atka Island in the Aleutians, about 2,000 miles west of Seattle. This line, which is temporary or provisional in nature, is the subject of much research designed to determine whether another line or lines would more equitably divide the Asian and North American salmon stocks.

A preliminary scientific session, begun on October 12, was held at the Commission's headquarters on the Campus of the University of British Columbia, Vancouver. This session brought together 15 scientists from the three countries for intensive study of the stocks of fish under abstention.

Each member country was represented on the Commission by four members. In addition to Edward W. Allen, Seattle attorney, who is Chairman of the Commission, the United States Commissioners included Milton E. Brooding of the California Packing Corporation, San Francisco; John H. Clawson, Anchorage, Alaska; and Arnie J. Suomela, Commissioner of Fisheries, U. S. Fish and Wildlife Service, Washington, D. C.

The Japanese Commissioners (all from Tokyo) were: Iwao Fujita, Vice-Chairman of the Japan Fisheries Association; Haruki Mori, Director of the American Affairs Bureau, Foreign Ministry; Kenjiro Nishimura, Director of the Fisheries Agency of Japan; and Koichiro Kobayashi, Vice-President of the Nichiro Fishing Company.

The Canadian Commissioners were George R. Clark, Deputy Minister of Fisheries, Ottawa; John M. Buchanan, President of British Columbia Packers Limited, Vancouver; James C. Cameron, Pender Harbour; and Roger T. Hager, President of the Canadian Fishing Company, Vancouver.

The Commissioners were accompanied by a number of experts and advisors, bringing the total number of participants to approximately 100. General arrangements for the meeting were made by the Commission's Secretariat.

INTERNATIONAL PACIFIC HALIBUT COMMISSION

DART TAG USED BY COMMISSION FOR FIRST TIME TO TAG HALIBUT:

This year for the first time the International Pacific Halibut Commission used the dart tag to tag halibut in the North Pacific. Tagging is used extensively by the Commission to determine when and where halibut can be fished to obtain full utilization of the North Pacific halibut stocks. The accuracy of results and consequently the usefulness of the tagging experiments depends upon the degree to which recovered tags are returned to the Commission.

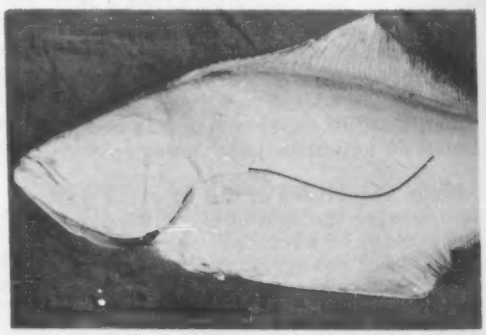


Fig. 1 - A dart tag in position on a North Pacific halibut.

No vessels were chartered during the summer and fall of 1958 for the express purpose of tagging halibut. However, the University of Washington

International (Contd.):

research vessel Commando was chartered for a period of 57 days during May and June 1958, and 222 halibut were tagged in the vicinity of Marmot Bay between Afognak and Kodiak Islands. A number of the tagged halibut were held in floating live boxes temporarily to observe the effects of tagging upon the fish. These observations indicated that the tagging process did not result in any significant mortalities immediately after tagging.

Strap tags are sometimes overlooked on the dark side of the fish because halibut are usually handled white side up. This loss reduces the practical value of the tagging experiments. The number of tags lost in this manner can be estimated by marking some of the fish with a second tag. For this reason some of the fish tagged in the Bering Sea in the spring of 1959 have a new type of tag (the dart tag[1/]) attached in the vicinity of the pectoral fin on the white side of the fish in addition to the strap tag. This tag consists of an orange vinyl plastic tube, approximately one-eighth inch in diameter and 12 inches in length and is held in place by means of a solid nylon plastic barb imbedded in the meat of the fish. The letters IPHC and a number are stamped on each tag.

To obtain a reliable measure of the efficiency of this tag, it was necessary to tag three groups of fish simultaneously. One group with only the new tag or "dart tag," a second group with only a strap tag (placed on the gill cover on the dark side), and a third group with both tags. Therefore, when a tagged fish is recaptured, it should be examined for both tags. If two tags are found, they should be

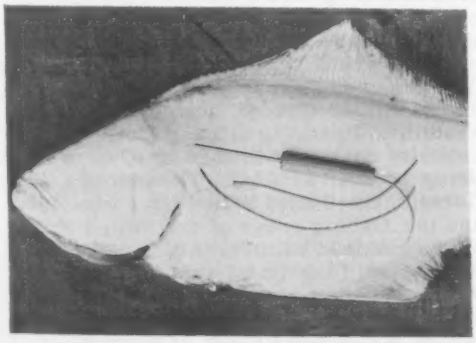


Fig. 2 - A fully-exposed dart tag lying beside one that has already been applied, and also a tag inserted into the hollow needle by which the tags are inserted in the halibut. The barbs on the tag do not show up well against the white background.

turned in together as this is the Commission's only means of correctly evaluating tag loss.

The fish migrating furthest in 1958 was caught by the M/V Capella I while fishing off Cape Scott. This fish was released in the Bering Sea off Akun Head in 1956 and had migrated approximately 1,550 miles in two years.

Two other fish tagged in the Bering Sea on the "Polaris Spot" also made long migrations of approximately 1,400 miles each. Both were recaptured in Dixon Entrance, one by the M/V Frisco and the other by the M/V Dovre B.

A new Commission record for length of time out following tagging was set when the M/V Oona R. recovered a fish released on December 21, 1939. This halibut was six years old when tagged and weighed approximately ten pounds. At recovery, 18½ years later, it had grown to approximately 65 pounds. During its period of freedom this halibut made a net migration of only about 60 miles, having been tagged off Cape St. James and being recovered in the vicinity of Cape Mark.

The greatest number of tags turned in during 1958 were received from the M/V Soupfin with 34. Closely behind with 33 recoveries was the M/V Kaare.

1/Although new for halibut tagging, the "dart tag" is being used for tagging many other fish.

UNITED STATES-JAPANESE TUNA CONFERENCE

PLENARY SESSIONS AND COMMITTEE MEETINGS HELD OCTOBER 1-11:

Japan and the United States held a meeting, which opened in Tokyo on September 30, for the exchange of views and information between the two countries on the tuna industry and its problems.

The Japanese Government announced September 28 that government officials and private fishing representatives of the two countries would meet for 13 days, with the meeting expected to end October 12, according to Japan Times of September 30.

The Japanese were represented by 11 Government officials and 13 private representatives, including a representative of the Foreign Office, the Director of the Fishery Agency, and the Vice-Chairman of the Japan Fishery Association.

The United States group comprised 10 Government and some 10 private representatives headed by the Deputy Assistant Secretary of State for Economic Affairs.

Discussions at the talks centered on:

1. Research on biological, ecological, and oceanographical aspects of tuna and

International (Contd.):

studies concerning distribution of resources.

2. The current tuna catch situation and catch methods.

3. Utilization of tuna and processing techniques.

4. Past trends in production, consumption, and price of tuna and its products in Japan and the United States.

October 1-5 was devoted to discussion in plenary sessions of all agenda items giving each country two full days. The chairmanship alternated between the two delegations. After October 5, the working sessions were divided into two comittees--one committee handled agenda items 1 and 2 and the second committee items 3 and 4. Simultaneous committee meetings were held through October 9. October 9-11 the meeting's final report was prepared.

At the final session held on October 12, 1959, the United States-Japanese Tuna Conference issued the following press release:

At the final Plenary Session of the Tuna Conference, the delegations of Japan and the United States reviewed and approved the work of the two Committees established at the opening session of the conference. These Committees reported the results of their consideration of the four items on the agenda of the conference: (1) Biological, ecological, and oceanographic study of tuna and the distribution of tuna resources; (2) Present conditions of harvesting and fishing methods of tuna; (3) Present conditions of utilization of tuna and technology of its processing; and (4) Past movements of the tuna market with respect to production, consumption, and price in each domestic tuna market.

In Committee One research on biology, ecology, and oceanography, and harvesting conditions with respect to tuna were reviewed. Information concerning research activity was freely exchanged and indicated that the broad objectives of such research were similar in the two countries.

With respect to research, the fields of inquiry discussed included methods and scope of the documentation and examination of fishing activity and of basic biological and oceanographic research.

It was noted that statistical information plus scientific information on the fisheries is essential to the measurement of the condition of the stocks, and both countries recognized the importance of this matter.

The Committee's deliberations indicated that extensive studies are being made of the ocean circulation of the Pacific and the relationship of the environment to the variations in distribution and migrations of tuna. These studies and research on life history were reviewed. No information presented indicated that there is overfishing of any tuna stocks.

Information on catch, catch trends and fleet composition, together with the factors affecting these, were freely considered. The Committee noted that the Japanese catches, fleets, and areas of operation have expanded in recent years. The number of vessels was stabilized in Japan in 1955 through a governmental system of licensing although tonnage and capacity continued to increase. It is now being gradually halted. The catches and fleets of the United States have declined, and the fishing areas of the United States have remained relatively the same. The increase in long-line fishing in Japan and the very recent tendency to place more emphasis on purse-seine fishing in the United States were noted. Government regulations and activities affecting these fields were compared.

It was learned that Japan has a comprehensive communications system reporting on current fishing conditions in which the Government participates, whereas the United States has not.

In Committee Two pertinent material concerning problems of utilization

International (Contd.):

common to the tuna industries of both countries was presented. There was a very informative discussion of such problems as green tuna, the biochemistry of tuna, quality standards, grading of tuna, the status of cholesterol research, the use of antibiotics in tuna preservation, and the use of tuna in pet foods. Information was presented pertaining to these subjects and views were freely exchanged. There were suggestions made by both sides concerning further exchange of information on these subjects.

In view of the importance of the tuna resource to each country, the world catch and its possible effect on future supplies of tuna were discussed. The total catch of tuna by all countries is steadily increasing, as is the world consumption.

Large segments of the tuna fishing industry of the United States have been beset with increasingly serious problems during recent years. Periods of distress during which the United States tuna fishing industry faced its most difficult problems were noted and the possible causes of these difficulties were discussed by the delegates of both countries.

The two delegations agreed that the conference had been very helpful to the tuna industries of both countries by providing an opportunity for the exchange of information and views on these subjects.

The two delegations noted that coordination of activities on specific research projects would contribute to the success of the research work being carried on by their respective governments.

The two delegations agreed to recommend to their respective governments (1) that supplementary data on scientific and technical matters of interest to both countries should be exchanged on a continuing basis through the usual channels; and (2) that, in cases where meetings for scientific research on tuna are held in either country, the scientists of other nations should be invited to take part in so far as possible.

UNITED STATES AND RUSSIA EXCHANGE SCIENTIFIC FISHERY KNOWLEDGE

Five American fishery experts returned home in late September following an extensive inspection of Russian salmon fisheries, and five Russian fish experts arrived in the United States to observe American salmon activities. The trips were arranged for an exchange of scientific and practical fishery information.

Fig. 1 - Assistant Secretary of the Interior for Fish and Wildlife Service, Ross L. Leffler, welcomes Russian fisheries experts at the beginning of their visit to the United States.

The Americans departed from Washington on August 20, 1959, with the Kamchatka Peninsula in Siberia as their destination. They arrived there, via Moscow, several days later and returned home, also via Moscow, on September 22. They spent one day in the Russian capital on their way to their Siberian destination, and four days on their way home.

The Russians arrived in Washington on September 24 and departed by plane for the Pacific Northwest and Alaska on September 26, returning to Washington about October 21. Their itinerary included inspection of salmon hatchery operations and the work of fish nutrition and fish disease laboratories in the Northwest. They saw the operations of can companies, canneries, fish

Fig. 2 - Russian fisheries experts, accompanied by the head of the Alaskan Department of Fish and Game and the U. S. Bureau of Fisheries Regional Director for Alaska, visit Governor Egan of Alaska in his office

International (Contd.):

freezing and cold-storage facilities. They also inspected several Government laboratories.

The United States mission to the Russian salmon areas had a double purpose--to give United States specialists an opportunity to learn of Russian fishery operations first hand, and to secure fish and fish blood samples of known Russian origin for a long-range international salmon study which has been in progress for about three years.

Members of the United States group reported success in both aims, stressing that their hosts were especially cooperative.

The North Pacific salmon study is a three-nation project--Japan, Canada, and the United States. One purpose of this study was to secure data upon which Nations of Asia and North America may base salmon management plans. A specific problem is to determine the place and the extent of intermingling of the American and Asian races of salmon during the time the salmon are at sea. This in turn necessitates the development of a system of differentiating American from Asian fish. Research has indicated that probably the most reliable way to differentiate between the two races is by blood type.

At the U. S. Bureau of Commercial Fisheries Biological laboratory at Seattle, Wash., considerable work has been with salmon and blood samples from Japan, Canada, and the United States salmon areas. No salmon unquestionably of Russian origin were available for study until this exchange visit when the Russians--although their salmon fishing season in most areas was closed--let the United States visitors "catch their own" out of streams on the Kamchatka Peninsula.

Places visited by the United States mission included:

Khabarovsk, the big industrial center in Siberia some 225 miles from the Sea of Japan;

Okhotsk, fishery center, on the northern rim of the Sea of Okhotsk;

The October Fishery Combine's canning, salting, and freezing operations at the mouth of the Bystraya River in the southern portion of Kamchatka;

Canneries, salteries, and freezing plants at Ozernaya, also on the southwest coast of that peninsula;

The biological station on the Kurilian Lakes, several miles inland from the coast, and one of the great red salmon producing areas of the U.S.S.R.;

Fishery facilities at Nevelsk on the southern portion of Sakhalin Island, north of Japan;

And finally the free port of Nakhodka, near Vladivostok, where cold-storage and other facilities for the transshipping of ocean-borne goods to the Trans-Siberian Railway were observed.

At these places important phases of the salmon fishing industry were inspected and discussed--hatchery work, biological research, technological problems, gear research, and fish processing operations. Besides the "on the spot" discussions, there were meetings at what might be called area or regional levels plus four days in Moscow with the fishery research unit of the scientific committees which are in charge of research conducted in the Soviet Union.

Transportation across Siberia was by jet--10 hours on the return trip. Transportation across the Sea of Okhotsk to Kamchatka, then to Sakhalin Island, and on to the mainland was by a Russian refrigerated carrier vessel which was described as efficient and with comfortable quarters. There were train transportation and truck travel for short distances. On the trip to the Kurilian Lakes part of the journey was by horseback.

The United States group that made the trip to Russia included: Charles Butler, Saltonstall-Kennedy Coordinator, U. S. Bureau of Commercial Fisheries, who headed the delegation; Clinton Atkinson, Laboratory Director, Bureau of Commercial Fisheries Biological Laboratory, Seattle, Wash.; Clarence F. Pautzke, Assistant Director, Washington State Department of Fisheries; Winston C. Arnold, General Manager, Alaska Salmon Industry, Inc.; William R. Barlow, Interpreter, Office of the Secretary of the Interior.

The Russians who are in this country are: Andre Sergeevich Guidukov of Moscow, Director, Section on Fish Industry, State Planning Commission, R.S.F.S.R.; Aleksander Ivanovich Isaev, Moscow, Deputy Chief of Construction and Hatchery Operations; Vasali Nikiforovich Kalenov, Deputy Director of the Kamchatka Economic Council; Aleksander Nikovaevich Salinikov, trawler captain engaged in salmon operations; Igor Ivanovich Kurenkov, Deputy Director of the Kamchatka Fishery Research Institute.

Australia

ALL-WELDED ALUMINUM ALLOY SPINY LOBSTER PROCESSING VESSEL:

A recent addition to the Western Australian fishing fleet is the 62-foot aluminium alloy spiny lobster processing vessel Lady of Fatima.

The spiny lobster fishery in Western Australia has reached a stage where it is necessary for the larger boats to travel long distances to get good catches, and therefore to be capable of stowing large amounts of fuel. Also, it is desirable that the boats be able to process a relatively large amount of fish in order to avoid the loss of time in trips to Fremantle to unload, possibly 240 miles both ways. This particularly applies when the weather is good and good catches are being made; then a boat needs a big freezer to store the catch.

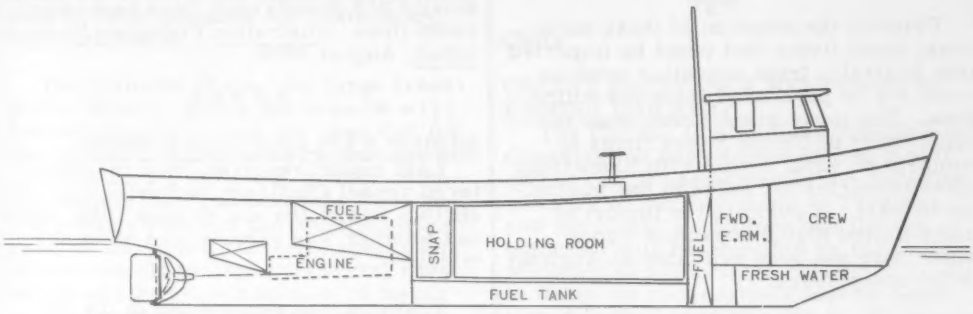
With these problems in mind, it was decided to build a new processing boat of aluminium alloy.

First the room available in a metal hull is greater than in a similar wooden hull, and by using a double bottom for fuel and fresh-water stowage, and built-in wing tanks for additional fuel, further space is saved and structural weight is reduced.

Second, by using aluminium alloy instead of steel, about half the structural weight is saved, and this is very impor-

Australia (Contd.):

tant when the speed required is high and a big payload is necessary. In this case 9 tons weight was saved by the use of aluminium.



General arrangement of Australian all-welded aluminium alloy spiny lobster processing vessel.

Third, the maintenance of an aluminium hull should be much less than for an equivalent wooden or steel boat, particularly a steel boat with its rust problem.

The boat's dimensions are: length over-all, 62 feet; beam, 17 feet; mean draught, 4 feet 9 inches.

A speed of 10.5 knots was required, and to achieve this an 8-cylinder turbo-charged Diesel, delivering 230 bhp. at 1,350 r.p.m., was selected. On trials, a speed of 10.75 knots was recorded, and over 10 knots is maintained in service.

Fuel capacity is 2,600 Imperial gallons. On average working conditions, consumption is about 6 to 8 gallons an hour, which gives the vessel a range of around 3,000 miles.

The freezer is of large capacity for the size of the vessel, being 21 feet long by the full beam and depth of the boat. The plant is capable of quick freezing 60 x 25-pound cases of spiny lobster in six hours, and the refrigerated hold has a capacity of 1,500 cases of tails or 33,000 pounds of finfish.

The craft is of all-welded construction, and all welding was done manually. The frames are extruded alloy angles and were bent cold to shape. The scantlings of the hull are rather generous, but no real difficulty was experienced in cold working the alloy. Also, hull distortion due to welding stresses was a lot less than expected.

All fuel tanks, water tank, etc., are alloy, built as part of the hull, and the deckhouse, which contains the wheelhouse, galley, and mess, and a berth for the wheel relief, is all welded alloy. There are four berths below decks. The forward peak tank holds 400 gallons of fresh water and an additional 100 gallons can be carried in one of the after ballast tanks

The anchor winch and pot-hauling winch are hydraulically-operated, with the hydraulic pump driven by the compressor engine.

Her sea behavior is much less lively than one would expect in a light buoyant hull. She maintains a very high speed in rough water. The fuel consumption is very good considered against the high operating speed. (Australian Fisheries Newsletter of June 1959.)

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MOST RESTRICTIONS ON IMPORTS FROM DOLLAR AREA REMOVED:

The Government of Australia has informed the United States Government that effective August 1, 1959, import quotas were enlarged and most discriminatory restrictions on imports from dollar sources were eliminated. This step should be of particular benefit to the United States, Canada, and other countries in the dollar area. In effect,

Australia (Contd.):

this measure opens the Australian market to dollar goods, on a nondiscriminatory basis for virtually all products except motor vehicles and timber.

Prior to the adoption of these measures, many items that could be imported into Australia from nondollar sources could not be purchased from the dollar area. The move greatly improves the opportunity of United States firms to compete on equal terms with firms from other countries for sales in the Australian market. It permits the import of many United States consumer goods which have not been available in Australia for many years.

This substantial liberalization of trade was facilitated by recent measures establishing currency convertibility and reflects the improved state of the Australian economy. The Government of Australia has announced that it intends to proceed with orderly removal of the remaining discriminatory restrictions.

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SPINY LOBSTER EXPLORATORY FISHING:

During the first two weeks of a spiny lobster exploratory fishing survey of southern waters in Western Australia, only eight spiny lobsters were taken. One was a female which would have spawned in 4-6 weeks. The lobsters were obtained in two areas about 20 miles apart. They varied in weight from 3 lbs. 4 oz. to 6 lbs. 9 oz. each. The survey is being conducted with the chartered vessel Bluefin, based in Albany.

The survey commenced on June 8, 1959. In the third and fourth weeks (to July 4), the Bluefin set pots in the neighborhood of Breaker Island, Peak Head, West Cape Howe, Knapp Head, Ratcliffe Bay, Wilson's Head, Edward's Point, and Stanley Island. No lobsters were taken.

The Bluefin has been working 90 pots. They are set about 100 yards apart, so that with a line of 50 pots a fairly large area of reef can be tested. It takes about two minutes for a pot to be set and about three minutes for a pot in 35 fathoms to be pulled. Salmon and shark heads, and cattle hocks are used as bait.

While traveling to the pots, two troll lines are usually put out. Bluefin tuna, mostly 2-3 pounds each, have been caught on the lines. Australian Fisheries Newsletter, August 1959.

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SHRIMP EXPLORATORY FISHING:

Last report received from the chartered vessel Challenge exploring for shrimp was to the end of June 1959. Some bad weather was experienced about the middle of June.

Trawling was carried out in the following areas: Port Hacking-Botany Bay, where there was a show of king prawns in 100 fathoms but no shrimp were taken in deeper water--Narrabeen, Broken Bay, Tuggerah, Terrigal.

Shrimp were taken in small quantity in 50-70 fathoms. Five deep-sea red shrimp were taken in about 140 fathoms. During the last week of June, in the Broken Bay area, red shrimp were taken in 85-150 fathoms. What was believed to be a new species of red shrimp was taken at 142 fathoms. Australian Fisheries Newsletter, August 1959.

Belgium

FISHING INDUSTRY FACES A CRISIS:

The crisis in the Belgium fishing industry, which has been developing for several years, recently received another severe blow when two large modern deep-sea trawlers were transferred to Great Britain. The loss of these two vessels precipitated talk in Belgium fishing circles of a blockade of the Port of Ostend. If the blockade is carried out, it would dramatize the fishing industry's plight and be its most aggressive step for obtaining Government assistance and the imposition of import restrictions.

According to reports in Belgium fisheries periodicals, the industry is faced

Belgium (Contd.):

with bankruptcy. A recent investigation of the financial condition of fisheries firms revealed that the majority of the firms could not avoid bankruptcy if there were drastic demands for payment by their suppliers.

The transfer of the two large trawlers to Britain, where the vessels will fish with English crews and land fish for the British market, means the loss of good producing units and further unemployment in the West Flanders Province. The same owners of the transferred vessels, which recently obtained special conditions to build two supertrawlers, have abandoned the project because of the distressed condition of the fishing industry.

Spokesmen for the fishing industry believe that it is time to save the industry, not with conferences and talks, but with facts and a well-planned fisheries policy. (United States Consulate in Antwerp, September 16, 1959.)

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SHRIMP FISHING INDUSTRY CONCERNED OVER PRICES:

According to a spokesman for the Belgium fishing industry there is a deep concern in the Belgium shrimp fishery over near-term prospects, because of the prospect of large fall catches. It was expected that increased landings would have a drastic effect on prices, unless something was done by the Government to protect this fishery, which has been affected by a serious crisis since 1956.

The spokesman suggested different solutions, among which was the establishment of a Government purchase program for shrimp, a minimum price set-up, and the application of a tax on the import licenses for shrimp from West Germany and The Netherlands, which compete with the Belgium shrimp fishermen.

He felt that appropriate measures taken by the Government could restore some of the vitality which characterized the Belgium shrimp fishery during its boom period 1948-1955, whereas lack of interest would lead to a certain collapse. (United States Consulate in Antwerp, September 4, 1959.)

Chile

CREDIT ASSISTANCE EXTENDED TO FISHING INDUSTRY:

The Chilean Government Development Organization has announced that it will extend credit assistance to the fisheries industry of the Provinces of Tarapaca and Antofagasta. Motors and fishing equipment will be imported by the Chilean Ministry of Agriculture and sold on credit to fisheries cooperatives legally established in these two provinces. Such purchases will be financed under the 5 billion pesos (about US$4.7 million) fund established by the Law of Rehabilitation of the Departments of Iquique and Pisagua. The Government hopes to extend its plan for credit assistance to fisheries industries in other areas of the Republic.

The Development Organization provided a US$500,000 allocation in its 1959 budget for use in facilitating the purchase of fishing boats. Authorizations have been made against this allocation, the United States Embassy in Santiago reported in an October 1959 dispatch.

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EXPORTS OF FISHERY PRODUCTS, 1955-1958:

Chilean exports of fishery products in 1958 set a new record--approximately 26.0 million pounds, valued at about US$2.0 million. This was about 3.2 million pounds (14 percent) more than the previous peak year of 1955 during which exports amounted to 22.8 million pounds, valued at US$1.2 million. The record 1958 exports were more than twice those exported during 1957 and also 1956.

During 1958, Chile increased its exports of frozen langostinos considerably and for the first time exported canned langostinos. The greatest increase in exports, however, was in fish meal. Exports of frozen tuna, which reached a

Chile (Contd.):

Chilean Exports of Fishery Products, 1955-58

Product	1958		1957		1956		1955	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Fresh or Frozen:	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Tuna	87.0	8.9	773.4	58.9	821.3	58.8	1,158.5	83.8
Bonito	-	-	13.2	0.7	1,195.0	29.3	-	-
Eel	10.8	1.4	17.3	2.4	37.5	6.8	37.0	5.1
Swordfish	-	-	-	-	5.2	1.1	-	-
Langostinos	1,094.3	625.3	841.8	536.7	219.7	133.0	0.6	0.1
Shrimp	61.8	21.2	33.4	19.7	-	-	-	-
Spiny lobster	-	-	5.8	4.4	59.9	37.5	6.6	4.3
Other fish & shellfish	41.4	2.2	409.5	20.5	565.9	37.7	1,611.0	90.2
Canned:								
Fish	195.0	35.9	625.0	125.5	1,035.7	148.8	764.6	134.9
Langostinos	371.1	208.2	-	-	-	-	-	-
Crab	11.7	4.2	21.3	9.9	7.9	3.9	0.2	0.1
Other shellfish	50.7	18.9	283.9	175.2	111.3	40.7	107.1	40.6
Fish meal	24,108.1	1,072.4	9,933.8	453.9	9,802.6	335.3	19,079.2	872.0
Total	26,031.9	$1,998.6	12,958.4	$1,407.8	12,862.0	$832.9	22,764.8	$1,231.1

Note: Values for 1958 converted at rate of 980 pesos equal US$1.
Values for 1957 converted at rate of 690 pesos equal US$1
Values for 1956 converted at rate of 547 pesos equal US$1.
Values for 1955 converted at rate of 300 pesos equal US$1.

peak of 1.2 million pounds in 1955, declined in 1956 and 1957, and then fell sharply to only 87,000 pounds in 1958. (Boletin Informativo, No. 65, January 1959.)

Cuba

CLOSED SEASON FOR SNOOK AND CROAKER ENDED:

The National Fisheries Institute of the Cuban Maritime Development Agency terminated the closed season on the capture of snook (robalo) and Atlantic croaker (corvina) effective August 25, 1959. The closed season on these species originally commenced on May 5, 1959.

The Resolution embodying the above measure was published in the Official Gazette No. 154 of August 19, 1959.

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FISHERMEN AND PACKERS FIX SPINY LOBSTER EX-VESSEL PRICES:

A June 8, 1959, agreement between Cuban fishermen and packers fixed the ex-vessel prices at all ports: for a 60-pound box of whole and a 20-pound box of spiny lobster tails US$11.50. The agreement was extended for 45 days on September 14, 1959, by a Cuban Government Resolution published in Official Gazette No. 172.

The base price of $11.50 is subject to deductions for shipping costs and for losses in weight from port to plant. The amount of these deductions will be determined by a three-man packing-plant committee made up of a representative of the fishermen, one for the packer, and a third representing the Government Maritime Development Agency.

A rumor persists that the Cuban Government plans to construct a fish and shellfish receiving plant on the shores of the Almendares River. Fishermen will be able to deliver their catches to the plant at prices established by the Government. The Government will then sell directly to the processors and eliminate the middleman. In this way the Cuban Government hopes to protect the fisherman from price fluctuations, according to a September 25, 1959, dispatch from the United States Embassy in Havana.

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SPINY LOBSTER POTS PROHIBITED ON THE NORTH COAST:

The National Fisheries Institute of the Cuban Maritime Development Agency published a resolution in the Official Gazette No. 172 of September 14, 1959,

Cuba (Contd.):

prohibiting the use of lobster pots. The restriction covers all the lobster fishing grounds including inlets, bays, harbors, keys, etc., on the northern coast of Cuba, between Key Bahia de Cadiz and Key Frances.

Egypt

SHRIMP IS PRINCIPAL PROCESSED FISHERY PRODUCT:

Egypt's principal processed fishery product is shrimp. Two large and two small factories located in Alexandria produce frozen raw and cooked shrimp. The entire amount of shrimp produced is exported to Italy, United States, Switzerland, and Greece.

Processed shrimp production in 1958 totaled about 350 metric tons, valued at E£118,000 (US$338,896).

Although it is thought that Egypt's shrimp industry has a great potential, there has been little progress made.

With reference to other fisheries, during 1958 there was no production of sardines in Egypt, since the only factory that processes that species remained inactive throughout the year. In the latter part of 1958, negotiations were under way with the Japanese for installation of a large sardine canning factory.

Egypt produces small quantities of dried and salted fish for domestic consumption. (Industrias Pesqueras, July 1, 1959, Vigo, Spain.)

El Salvador

FISHERY TRENDS, OCTOBER 1959:

Exploitation of El Salvador's Pacific Coast marine fisheries, which began only recently on a commercial scale, is still a matter of great interest to businessmen interested in profitable diversification. Licenses have been granted for several additional shrimp vessels, and the United States continues to provide the major market for the shrimp catch. Reliable figures on shrimp exports are not maintained, the best available being United States import statistics. According to these statistics, El Salvador exported 1,130,000 pounds (value US$660,060) of shrimp in 1958 and 1,112,000 pounds valued at US$649,000 in the first eight months of 1959.

Under present practices most of the catch consists of fish, which are thrown overboard by the crews, while only the shrimp are retained. Recently a Salvadoran group proposed that American investors might be interested in a fish meal and fish fertilizer project, which would use the discarded fish as a raw material. Fish flour could provide a valuable supplement to local diets, which are strikingly low in protein.

The Food and Agricultural Organization (FAO) for some time has been considering establishing a regional Fishery Research Institute for Central America, and this plan was discussed at the recent meeting of Central American Economic Ministers in San Jose, Costa Rica. Due to the lack of fisheries organizations in the various countries, however, it appears likely that such an institute will not be possible for some time, with more attention probably needed to build local skills in each country first. (United States Embassy dispatch from San Salvador dated October 15, 1959.)

French West Africa

TUNA FISHERY, 1958/59:

Landings of tuna at Dakar, French West Africa, for the season which opened on December 1, 1958, and ended on March 31, 1959, amounted to 6,957 metric tons. About 4,500 tons of the seasonal tuna landings were processed by the five local tuna canneries and the balance was frozen and shipped to France.

The catch was considered satisfactory in view of the decision of the French Merchant Marine Agency of November 7,

French West Africa (Contd.):

1958, which called for a minimum catch of 6,000 tons by the French mainland tuna clippers, two thirds of the catch to be processed in Dakar and the remainder sent to France.

A total of 23 vessels participated in this season's activities. Twenty came from French fishing ports: 9 from Concarneau, 4 from Sables d'Olonnes, 3 from Ethel, 2 from Bayonne, 1 from Croix, and 1 from La Rochelle. The other three were Senegalese vessels.

Despite the smaller catch, the season proved much more profitable than that of last year, during which 95 vessels landed only 9,500 tons.

Tuna fishing out of Dakar has been aided by the cold-storage facilities of the port which has 30,000 square meters of refrigeration space and also space for the dressing of the tuna before freezing, according to an August 31, 1959, dispatch from the United States Consulate in Dakar.

German Democratic Repubic

FISHING INDUSTRY PROVIDES ONLY 25 PERCENT OF NEEDS:

Despite its large fishing fleet, East Germany's fishing industry can only provide 25 percent of the fishery products needed to supply the demand. This is blamed on technical inadequacies of the fishing fleet and the long voyages that have to be made by vessels to reach the fishing grounds. As a result, the demand for fishery products cannot be satisfied domestically and East Germany can only use half of its actual processing potential for fishery products.

East Germany has petitioned for the use of the Russian port of Murmansk as a base for fishery operations. Russia has not heeded the petition.

Plans have been made for the construction of several factoryship-trawlers which can stay at sea for periods of two months, but these vessels will not be in service before 1965. (Allgemeine Fischwirtschaftszeitung, a West German fishery periodical.)

German Federal Republic

EXPLORATORY FISHING FOR 1959/60 PLANNED:

The West German Federal Government has appropriated DM475,000 (US$114,000) to finance exploratory fishing by otter trawlers.

According to the Federation of the German Deep-Sea Fisheries in Bremerhaven, this amount will cover the expense of seven exploration trips. Commercial fishing trawlers will be used. The search for new fishing grounds will be combined with commercial fishing. Trawler operators will be guaranteed gross daily proceeds of up to DM5,000 (about US$1,200), to be offset by receipts from the sale of the fish caught during the trip.

Three trips were made during the fall of 1959 to Northeast Atlantic waters, off the coasts of Newfoundland, North Labrador, and South and Southwest Greenland. Two trips to Southwest Greenland waters will be made in the spring of 1960.

The West German exploratory fishing program also included two trips into the North Sea during the 1959 fall herring season to test mid-water trawling.

In all instances, the trawlers will carry scientists of the West German Federal Fisheries Research Institute.

The results of the searches will be relayed immediately to trawler operators to ensure maximum practical results of the program, the United States Consul at Bremen reported on October 6, 1959.

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German Federal Republic (Contd.):

FISHERY LANDINGS, 1958:

During 1958 the West German fishing fleets landed 651,179 metric tons (close to 1,435 million pounds) of fish and shellfish. About 46.8 percent of the total landings came from the North Sea area, about 18.2 percent from the grounds off Iceland, and the balance from widely-scattered fishing grounds between Bear Island and the Barents Sea, off the northern tip of Norway, to waters off Laborador. The landings from the newly discovered fishing banks off the coast of Laborador and Newfoundland accounted for about 3.3 percent of the total 1958 landings.

West German Fishery Landings, 1958, by Principal Species and Fishing Grounds

Fishing Ground	Herring	Cod	Haddock	Coalfish (Pollock)	Ocean Perch	Shrimp and Crabs	Other Species	Total
	(Metric Tons)							
North Sea	185,124	3,475	2,734	8,944	4	28,372	75,905	304,558
British Channel	8,990	14	3	12	-	-	757	9,776
West British waters	14,267	261	194	356	-	-	1,363	16,441
Baltic Sea	18,926	11,819	-	3	-	-	9,291	40,039
Kattegat	69	187	4	4	-	98	323	685
Iceland	-	27,597	4,753	17,960	52,076	-	15,827	118,213
Norwegian Coast	28	11,077	4,899	17,630	7,908	-	2,774	44,316
Barents Sea	-	563	63	127	534	-	83	1,370
Bear Island	-	1,722	78	154	4,481	-	373	6,808
Greenland	-	20,047	68	104	15,718	-	1,700	37,637
Faroe Islands	-	529	10	2,477	2,676	-	1,432	7,124
Newfoundland	-	291	212	602	73	-	144	1,321
Labrador	-	513	-	8	19,086	-	417	20,024
Other fishing grounds	12,846	6,280	668	4,550	12,980	-	5,542	42,866
Total	240,250	84,375	13,686	52,931	115,536	28,470	115,931	651,179

In 1958, for the first time, West German trawlers caught significant catches of herring off the east coast of Ireland--close to 6 percent of the 1958 herring landings came from that area. West German landings of herring from the traditional herring fishing grounds in the North Sea and English Channel dropped from 93 percent in 1957 to 81 percent in 1958. Lower landings of ocean perch from the Norwegian, Bear Island, and Greenland fishing grounds were offset by increased catches made on the Icelandic and Labrador grounds. Another shift in 1958 was increased cod landings made in the Iceland and Greenland areas instead of in the Baltic, Bear Island, and Barents Sea.

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FOURTH STERN-TYPE TRAWLER PLACED IN SERVICE:

On September 24, 1959, a Bremerhaven shipyard delivered a new stern trawler to a fishing company located in the same city. This is the second ship of this type of trawler built by this company and the fourth ship of its kind now operating in West Germany. The first stern trawler Heinrich Meins was placed into service in May 1956. Its Voith-Schneider propellers caused considerable trouble, and were finally replaced by conventional propellers.

The new trawler is reported to be an improved version of the Heinrich Meins. The ship is powered by a 1,650 hp. Diesel driving conventional propellers. Its cruising speed is stated to be 15 knots. The measurements of the trawler are as follows: over-all length 67.25 meters (220.6 feet); length between perpendiculars 57.60 meters (188.9 feet); moulded breadth 9.60 meters (31.5 feet); moulded depth up to main deck 7.15 meters (23.5 feet); and moulded depth up to second deck 4.90 meters (16.1 feet). The fish-hold capacity is 280 metric tons. In addition, the ship has a separate refrigerated hold of 64 cubic meters to store frozen fish. It is equipped with fish processing and freezing equipment. (United States Consul in Bremen, September 30, 1959.)

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GEAR EXPERT DEMONSTRATES IMPROVED MIDWATER TRAWLING:

Promising catches of herring and sprat have been made by West German fishing vessels with a new type of one-boat midwater trawl gear, consisting of a high-opening nylon net, hydrofoil otter boards, and an echo-sounder oscillator attached

German Federal Republic (Contd.):

to the headline of the net for continuous trawl depth indication and fish detection.

This method has been perfected by a gear technologist on the staff of the Fisheries Division of the Food and Agriculture Organization (FAO), Rome. It is based on experimental work carried out by the technologist when a member of a Hamburg, West German, research institute.

The technologist states: "I was loaned by FAO to the West German Institute in December 1958 to carry out midwater trawling experiments with a typical German North Sea cutter. These boats are about 24 meters (78.7 feet) over-all, powered with 150 hp. engines. When trawling in midwater the cutters usually work in pairs, two boats towing one net between them. In Germany there is also a rather primitive one-boat method using conventional otter boards which are kept at the desired depth by attaching them to big surface floats. In our experiments we concentrated on improving the one-boat trawl.

"The main problem in midwater trawling has been to tow the net at the proper depth to catch the fish, and control the net so that it can be quickly raised or lowered as desired. As you know, the shorter the warps and the higher the towing speed, the higher the net will travel through the water. But this general rule applies only to a small degree to the one-boat trawl where the depth of the net has to be adjusted by changing the length of the warps connecting the otter boards with the surface. Furthermore, accurate adjustment of the net to the actual depth of the fish requires continuous indication of the depth of the net, so that the proper action can be taken in time."

The basic idea of his method is not new. It consists of attaching an oscillator (transducer) to the net and connecting it by cable to the echo-sounding unit installed on board.

An echo-sounder oscillator attached to the bosom part of the headline to sound downwards indicates not only the depth of the net, but also the position of the footrope and the fish in the net-opening and below the net, as well as the sea bottom.

"This enables the fishermen to know the depth of the net, check if the gear is operating properly, and to see if the fish in the path of the net are really caught," said the technologist. "With some experience, he should be able to estimate the rate of catch and so determine the right time for hauling. These very obvious advantages make it much easier to accept the slight trouble of handling an extra cable."

The experimental net had an opening height of 8 to 10 meters (27 to 33 feet) and, to improve its maneuverability, hydrofoil otter boards, designed in Hamburg, were used. These provide a good sheer at a considerably lower drag as compared with the conventional boards. The warp is attached above the center of the board which gives an inward tilt, the lift varying with the towing speed. This increases considerably the influence of speed variations on the depth of the net, and enables the skipper to regulate the the depth through engine control.

This new gear combination enables the skipper to practice "aimed" fishing in what has hitherto been mostly a blind operation.

The skipper of the cutter chartered for the experiments was soon able to handle the gear and, since the experiments, has successfully fished with it on a commercial scale. He has often caught the same amount, or even more, than have the pair-trawl boats fishing nearby.

German deep-sea trawler companies are very interested in midwater trawling for herring, particularly as an additional method for craft of 400 to 500 BRT and 600 to 800 hp., which are not suitable for fishing on the distant grounds off Greenland, Newfoundland, and Labrador.

"Considering the promising results of the cutter experiment," the technologist stated, " it was advisable to test this type of gear with a medium-size deep-sea trawler, too. The experiments were carried out with a steam trawler

German Federal Republic (Contd.):

of 4,000 BRT and 600 hp. in the northern North Sea during February 1959. A very big and light nylon trawl was made which worked with an opening height of 12 to 14 meters (39.4-45.9 feet). We used basically the same echo-sounder oscillator arrangement but with an automatic electric winch essential for handling the 400-fathom cable needed for fishing at about 110 fathoms."

The method proved to be applicable for these bigger craft and valuable experience was gained for future improvements. Catches of up to 3½ tons of herring per haul were made which were considered fairly good in view of the limited size and density of the schools present.

An interesting innovation was tested during these trials, that of an oscillator on the trawl headline transmitting concurrently up to the surface and down to the bottom. This gives the skipper much better information on the actual trawl depth. Irregularities of the bottom profile may be mistaken for net movements and vice versa, but the indication of the trawl's distance from the surface eliminates this difficulty completely.

The result of these experiments, financed by the German Ministry of Agriculture on request of the German fishing industry, is a big step forward in improving the technique of commercial midwater trawling.

It is likely that this method of "aimed" trawling may lead to exploiting pelagic fish resources which have not been, or only to a limited extent, fished so far. (Canadian Trade News, July 1959.)

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IMPORTS AND EXPORTS OF MARINE OILS, 1958 AND JANUARY-JUNE 1959:

Imports: During 1958 West Germany imported 78,820 metric tons of whale oils, valued at US$16.7 million (DM69,855,000), and 64,334 tons of fish oils, valued at US$12.1 million (DM50,633,000). Whale oil imports in 1958 increased over the preceding year, but fish oil imports were lower. The shift of the West German edible fats and oils industry to higher-quality oils for use in the manufacture of margarine continued in 1958. The chief suppliers of whale oils to the West German market were the leading whaling countries with about 35.9 percent of the 1958 imports supplied

West Germany's Imports and Exports of Marine Oils, 1958 and Jan.-June 1959

Country of Origin	Whale Oils				Fish Oils			
	1958		Jan.-June 1959		1958		Jan.-June 1959	
	Quantity Metric Tons	Value US$ 1,000	Quantity Metric Tons	Value US$ 1,000	Quantity Metric Tons	Value US$ 1,000	Quantity Metric Tons	Value US$ 1,000
Imports:								
Angola	-	-	-	-	6,992	1,211	3,097	458
Argentina	692	136	-	-	38	7	-	-
Australia	3,611	738	353	73	-	-	-	-
Chile	941	195	-	-	74	11	-	-
Denmark	244	41	-	-	2,344	410	1,594	274
Great Britain	3,328	651	1,572	295	508	94	584	108
Iceland	3,394	697	490	93	7,527	1,466	251	47
Japan	24,437	5,220	24,547	5,061	-	-	3,790	710
Netherlands	3,744	774	1,795	275	2,786	488	714	116
Norway	28,287	6,039	26,969	5,489	7,643	1,657	2,433	428
Panama	7,920	1,756	-	-	-	-	-	-
Peru	937	162	836	127	912	159	3,829	544
Portugal	644	132	-	-	1,887	304	1,137	154
Union of South Africa	17	4	-	-	9,241	1,632	1,198	202
United States	624	130	871	162	21,294	4,103	9,927	1,761
Other	-	-	9	2	1/ 3,088	1/ 545	2/ 1,682	2/ 295
Total	78,820	16,675	57,442	11,577	64,334	12,087	30,236	5,097
Exports:								
All countries	268	76	492	16	3/ 14,715	2,839	7,094	1,241

1/ Includes 1,645 tons valued at US$320,000 from Canada.
2/ Includes 1,123 tons valued at US$209,000 from Canada in Jan.-June 1959.
3/ Shipped principally to Sweden (7,005 tons), Denmark (3,948), Netherlands (1,611), Norway (1,870), and the balance to a number of other countries.
Note: Values converted at rate of 4.189 Deutschmarks = US$1 for 1958 and 4.180 Deutschmarks = US$1 for Jan.-June 1959.

German Federal Republic (Contd.):

by Norway and about 31.0 percent by Japan (see table on previous page). The United States was the largest supplier of fish oils to Germany--about one-third or 21,294 tons out of the total imports of 64,334 tons in 1958 came from the United States.

In the first six months of 1959 imports of fish oils from the United States remained at about a third of the total imports of 30,236 tons, but imports from Peru and Japan were up sharply.

Exports: Exports of whale oils by West Germany were negligible and amounted to only 268 tons in 1958. However, in 1958 about 22.9 percent, or 14,715 tons, of fish oils were exported. These exports were chiefly to nearby countries in Western Europe.

Prices: Average cost per metric ton of whale oil in 1958 was close to $211.56 as compared with an average of $201.54 for imports made during the first six months of 1959. Fish oil price average for 1958 was about $187.88 a ton, or about $19.31 a ton higher than average prices for the first six months of this year.

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PRODUCTION METHODS FOR FISH FLOUR DEVELOPED:

A firm in Bremerhaven, West Germany, has developed methods and equipment for the manufacture of fish flour for human consumption in collaboration with the Food and Agriculture Organization. The project was planned to develop protein supplements for addition to diets of the populations in countries lacking sufficient animal protein.

The German firm claims that its product contains 65-70 percent animal protein, B vitamins (including B_{12}), calcium, and phosphorus. The moisture content of the fish flour is stated to be 2-3 percent. The fish flour can be completely and permanently deodorized or may be produced with a fish flavor. Because of its low fat content amounting to only 0.2-0.3 percent, fish flour packed in a vacuum may be stored for at least one year without deterioration of its quality. It is claimed that a total of 49 nourishment tests conducted in 14 tropical or semi-tropical countries have yielded positive results.

At the present time, the Bremerhaven firm is negotiating with foreign interests for the sale of a combined fish flour and fish meal plant. (United States Consulate dispatch from Bremen, dated October 6, 1959.)

Iceland

FISHERIES TRENDS, SEPTEMBER 1959:

The larger part of the Icelandic trawler fleet, which began fishing off Newfoundland two months early this year, found ocean perch operations rather poor in September. An Icelandic trawler which has been conducting fisheries research in the area since August has still failed to locate new ocean perch grounds.

Some new markets for frozen ocean perch fillets have been opened up in the United States and in West Germany, but Russia has still failed to purchase an additional 6,000 metric tons of these fillets, as proposed by the Icelanders.

While German trawlers are engaged in the North Sea herring fishery, four Icelandic trawlers have begun supplying West German ports with iced fish from Greenland-Iceland waters, the United States Embassy in Reykjavik reported on September 25, 1959.

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HERRING FISHERY AND WHALING TRENDS, SEPTEMBER 1959:

The Icelandic south and southwest coast drift-net herring season was off to a slow start as the herring schools failed to appear. Pessimism is already being expressed regarding ability to fill large orders for salted herring now under contract and negotiation with the Soviet Bloc. It is a foregone conclusion that no significant amount of salted herring will be sold this year in the United States.

Iceland (Contd.):

An unusually poor whaling season closed on September 28, 1959, with a total of 371 whales landed as compared with 508 in 1958, and 517 in the very good year of 1957, the United States Embassy in Reykjavik reported on October 9, 1959.

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MARKET FOR SOUTH COAST HERRING IN SOVIET BLOC IMPROVED:

With Iceland's south coast herring season under way in September, the Icelandic Herring Production Board expressed optimism regarding negotiations for sales to the Soviet Bloc of 90,000 barrels of salted herring. This approximates the entire amount of the catch salted for export in 1958 and is 10,000 barrels greater than advance Bloc contracts in 1958. Russia has indicated readiness to buy 20,000 barrels in addition to the 40,000 barrels of south coast herring already contracted for; the Poles have expressed some interest in buying 20,000 barrels, and the East Germans, 10,000 barrels.

If these sales materialize, Soviet Bloc salted herring purchases (including 80,000 barrels from the north coast by the U.S.S.R.) will amount to 170,000 barrels valued at about Ikr. 57 million (US$3.5 million).

India

RUSSIAN FISHERY BIOLOGIST TO SURVEY BAY OF BENGAL:

A member of Soviet Russia's Research Institute of Marine Fisheries and Oceanography has arrived in India on an assignment as marine fishery biologist on behalf of the Food and Agriculture Organization (FAO), Rome, Italy.

In an interview at FAO Headquarters before leaving for India, the Russian biologist stated: "My principal work will be to advise the Indian Government on exploratory fishing in the Bay of Bengal and to assist in carrying out a survey of demersal stocks in the Bay and in adjacent waters."

His work will be in addition to, and will supplement, the work carried out by a number of FAO fisheries experts in India during the past few years.

Iran

FISHERIES TRENDS, SEPTEMBER 1959:

The joint Iranian-United States shrimp fishing company has 10 shrimp vessels operating in the Bandar Abbas area, and the local agent reported that the catch is very large. The shrimp are frozen and packed for shipment to the United States on board one of the larger vessels and transferred to ocean-going cargo vessels at Bandar Abbas; thus, there are no adequate statistics on the catch. The shrimp vessels are provisioned from Khorramshahr by a small chartered coastal freighter. The mothership scheduled to arrive from Houston, Texas, had not appeared as of the end of September.

A joint Japanese-Iranian company was set up about four years ago, first with private Iranian capital and then with the Plan Organization. The Japanese did not work well with the Iranians and withdrew their boats about a year and a half ago. Since that time the company, wholly-owned by the Plan Organization, has continued limited operations, buying fish from local boats in Abadan and renting freezer space in Customs. Now, if funds can be obtained from the Plan Organization, more intensive operations may be resumed. In view of the demands made upon the Plan Organization from its other projects, it is questionable that much money will be available for the fisheries, the United States Consulate in Khorramshahr reported on October 1, 1959.

Japan

CANNED TUNA-IN-BRINE EXPORTS TO UNITED STATES, JANUARY-MAY 1959:

During the first five months of 1959, Japan exported 124,690 standard cases (48 7-oz. cans per case) of canned white meat tuna-in-brine and 75,040 standard cases of canned light meat tuna-in-brine to the United States. Prices per standard case for white meat tuna-in-brine at the canners' level averaged about US$9.55 and for light meat tuna-in-brine about US$7.17 per case.

Japanese Canned in Brine Tuna Exports to United States, January-May 1959

Type	Actual Cases	Standard Cases[1/]	Canners' Value (US$)
White meat in brine	119,275	124,690	1,190,891
Light meat in brine	71,799	75,040	537,822

1/ 48 7-oz. cans.

Note: These data may differ from published United States import data since United States data do not seem to accurately classify white meat and light meat.

* * * * *

PLANS FOR 1959/60 WHALING SEASON:

The Japanese whaling industry has announced its intention to send out the same six fleets as last year and to limit its catch to the 1958/59 level or 5,037 blue-whale units. According to reports reaching Japan, Norway plans to take 5,900 units, the Netherlands 1,200, the United Kingdom 15/80 (about 2,812 blue-whale units) of the total planned catch, and the Soviet Union 20 percent of the total. It is estimated that these plans may result in a total catch of about 18,000 blue-whale units or 3,000 more than the Whaling Commission's 1958/59 quota limit, which many biologists considered was already too high for proper conservation of the whale populations. The Japanese Government will wait for the reaction of the European whalers to the Japanese industry's plan before giving its official sanction, and some slight optimism still seems to be felt that when the industries of the five whaling nations realize the full implications for the future of this excessive whale catch, they may reexamine the possibilities of a reasonable compromise on apportionment of the catch.

The question is beginning to arise in the Japanese industry as to whether the six Japanese fleets will continue to compete freely with each other under their national quota in a miniature version of the former "Whaling Olympics" or whether a system of catch allocations will be set up within the Japanese industry. A decision on this potentially stormy question will likely be left until just before the whaling season, the United States Embassy in Tokyo reported on September 17.

Since the withdrawal of the Netherlands and Norway from the International Whaling Convention in July of 1959, there has been much speculation as to how the catch of whales might be regulated in the 1959/60 Antarctic whaling season. In the past the fleets of the five Antarctic whaling powers--Japan, the United Kingdom, Norway, the Netherlands, and Russia--have competed freely for their share of the 15,000 blue-whale-unit catch limit set by the International Whaling Commission. A growing dissatisfaction with this system on the part of the European whalers led to a number of meetings since last winter at which the whaling industries tried to work out a formula for apportioning the permissible catch among the five nations. When these efforts failed, Norway and the Netherlands withdrew from the Convention, and the catch limitation imposed in the past by the Whaling Commission became essentially a dead-letter.

* * * * *

RESIN-LIKE SUBSTANCE FROM FISH OILS DEVELOPED:

Experiments conducted in Japan have shown that chlorination of fish oil results in the formation of a resin-like substance which seems to be a promising main ingredient of coatings such as varnish. Fish oil, which is previously treated with alkali to remove free fatty acids, is dissolved in CCl_4 (carbon tetrachloride) and chlorine gas is bubbled through it. The resulting product is a white, odorless powder, soluble in most organic solvents except in lower alcohols and ligroin. The product is stable and a solution in toluene is transparent, slightly yellow and forms a glossy, waterproof film. The film is durable and not corrosive to iron, copper, and aluminum

Japan (Contd.):

(Bulletin of the Japanese Society of Scientific Fisheries, vol. 24, no. 1, 1958).

Korea

FISHERIES TRENDS, AUGUST 1959:
The Central Fisheries Experiment Station in Korea has received initial contacts from two seafood companies in the United States requesting sample shipments of Korean frozen fish products.

One Korean company has completed its frozen fishery products processing facility at Pohang. The facility was inspected and approved under the new frozen fishery products inspection regulation of Korea. In addition, processors in the Pohang-Kampo area were preparing frozen shrimp for export against a $30,000 order from the United States.

The commercial shrimp vessel Pyung Namho, operating under the guidance of Experimental Station technicians, reported average catches of over one metric ton per day of whole mixed size shrimp. One day's catch totaled 70 boxes (probably about 22 pounds per box) of jumbo, 63 boxes medium, and 30 boxes small. This compares to 20 boxes formerly considered a good day's catch. This vessel is working on fishing grounds developed by Experimental Station vessels under the United States Operations Mission shrimp development program.

The two tuna long-line vessels also purchased under the 1957 boat procurement project completed their first trip and reported full loads of 55 tons each in 21 days. (United States Operations Mission, Korea, report of September 28, 1959.)

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REVIEW OF FISHING INDUSTRY, 1958:
The Korean fisheries industry supplies an estimated 85 percent of the animal protein consumed by the Korean people. It is also an important source of foreign exchange, providin .bout 20 percent of the total value of Korea's e cts.

Despite improvements in the industry and increased production, the Korean fishing industry still faces great problems. Methods of fishing, vessels, and gear must be modernized. Available finances are limited. Marketing facilities and sanitary standards must be improved, especially for the export market. The Korean government is assisting and encouraging the industry, but the achievement of desired goals will be slow. (United States Embassy in Seoul, report dated September 10, 1959.)

Production of Marine Products: The source of Korean marine products are (1) coastal and offshore fisheries and (2) aquiculture. The former includes the production of fish, shellfish, seaweeds, and other aquatic animals and plants from coastal waters of the Republic of Korea. This is the mainstay of the Korean fisheries industry, providing annually about 95-98 percent of the total marine products landed in the country. Production from aquiculture refers to the culture of oysters, clams, and other shellfish and seaweeds.

Table 1 - Korea's Production of Marine Products, 1954-1958 1/

Year	Fish	Shellfish	Seaweed	Other Aquatic Products	Total
			(Metric Tons)		
1958	291,191	15,884	28,759	59,359	395,193
1957	279,768	12,187	34,798	76,405	403,158
1956	257,518	9,778	24,424	49,197	340,917
1955	190,424	6,799	20,019	41,992	259,234
1954	188,941	10,455	17,253	32,887	249,536

1/Exclusive of aquiculture and agar-agar production, and tuna landings in American Samoa.

Total landings of marine products in 1958 were 403,412 metric tons, approximately 1.5 percent less than the previous year but still substantially above the annual production of any other year since 1950. Of this year's production, 395,193 tons, or almost 98 percent, came from coastal and offshore fisheries, the rest (8,219 tons) from aquiculture.

The marine products from coastal and offshore waters in 1958 totaled 395,193 tons, a decrease of 2 percent from 1957. Compared with 1957 production by class of product, production of fish increased 4 percent and of shellfish 30 percent, while production of seaweed and other aquatic plants and animals decreased by 17.4 percent and 22.3 percent, respectively.

Of the coastal and offshore fisheries landings in 1958, fish constituted 73.7 percent with 291,191 tons; shellfish 4.0 percent with 15,884 tons; seaweeds 7.3 percent with 28,759 tons; and other aquatic plants and animals 15 percent with 59,359 tons.

The value of the total landings of various products in 1958 was estimated at about Hw50.3 billion (US$60.6 million at the official exchange rate of Hw500 equals US$1).

Total value of the 1958 production of coastal and offshore fisheries is calculated at Hw28.7 billion (US$57.4 million at the official exchange rate of Hw500 equal $1). This amount was 10.8 percent greater than the 1957 value and included Hw 24 billion ($48.0 million) for fish, Hw1.1 billion ($2.2 million) for shellfish, Hw0.9 billion ($1.8 million) for

Korea (Contd.):

seaweed and Hw2.7 billion ($5.4 million) for other aquatic animals and plants.

The most important species of fish by volume caught in 1958 were saury-pike, horse mackerel or bluefin tuna, Alaska pollock, anchovy, yellow croaker, and hairtail. As compared to 1957, the decreased catch of particular species was attributed to unfavorable currents and/or temperatures, while the tremendous increase in horse mackerel production was due to the discovery of a new fish resource in the vicinity of Mooksan Island. The decrease in production from coastal and offshore fisheries of seaweeds and other aquatic plants and animals is attributed to adverse currents and temperatures, and price developments in domestic markets for certain species.

Table 2 - Korean Production of Coastal and Offshore Fisheries by Important Species

Product	1958	1957	1956
	(Metric Tons)		
Fish:			
Flounder (flatfish)	9,450	6,166	6,279
Mackerel	5,793	12,788	13,931
Saury-pike	20,651	22,872	14,734
Horse mackerel (bluefin tuna)	48,361	13,138	10,490
Alaska pollock	39,336	43,438	30,954
Anchovy	37,834	34,679	29,056
Yellow croaker (corvenia)	24,585	34,838	33,045
Hair-tail	30,555	38,611	48,220
Bastard halibut	2,720	2,598	2,428
Sand launce	4,399	7,336	2,839
Shark	7,926	7,160	8,821
Other fish	59,580	56,144	56,721
Total	291,191	279,768	257,518
Shellfish:			
Short-necked clam	2,279	1,260	1,119
Sea mussel	3,162	1,897	1,125
Oyster	2,083	1,565	1,548
Stiegele mussel	1,714	1,602	366
Spiny whelk	1,074	1,517	855
Abalone	1,617	842	573
Head clam	498	457	1,003
Heart clam	1,456	846	168
Other shellfish	2,001	2,201	3,021
Total	15,884	12,187	9,778
Other Aquatic Animals and Plants:			
Cuttlefish	33,519	39,455	21,755
Shrimp	16,296	25,672	17,588
Whale	1,233	2,587	2,226
Prawn shrimp	637	808	760
Crab	1,493	1,243	882
Octopus	2,152	1,109	1,650
All others	4,029	5,531	4,387
Total	59,359	76,405	49,198
Grand Total	395,193	403,158	340,917

In addition to the products of coastal and offshore fisheries, Korea raises such products as oysters, clams, abalone, and other shellfish and seaweeds. Shellfish are raised by sowing seeds in definite culture grounds, and seaweeds by placing brush or netting for collection of spores in coastal waters.

During 1958 Korea obtained 8,219 tons of marine products from aquiculture. This amount was 34 percent greater than in 1957. The outstanding feature of aquiculture production in 1958 was the 41 percent increase in the oyster yield, the production of which the Government is trying to encourage. Methods of encouragement include financial loans and allocations of materials to build new culture grounds. In 1958 the Office of Marine Affairs built 1.9 million pyung (1,552 acres--1,224 pyung equals 1 acre) of new culture grounds with 280 million hwan ($560,000) from the National Treasury Subsidy Fund and 1.3 million pyung (1,062 acres) with 182 million hwan ($364,000) from the 8th Reconstruction National Bond Fund, or a total of 3.2 million pyung (2,614 acres) with 462 million hwan ($924,000).

Table 3 - Korean Production from Aquiculture by Important Species

Commodity	1958	1957	1956
	(Metric Tons)		
Laver	737	640	1,059
Oyster	6,215	4,400	3,453
Short-necked clam	168	124	584
Abalone	20	1	-
Cockles	645	500	340
Others	434	460	218
Total	8,219	6,125	5,654

Not included in the data above are an estimated 280 metric tons of tuna caught in 1958 by the Koreans in deep-sea fishing in the vicinity of American Samoa. The catch, valued at roughly $70,000 was sold to the United States firm operating the cannery on that island. The Office of Marine Affairs does not include the results of the deep-sea fishing operation, which began in 1957, in its statistics on the Korean fishing industry.

Utilization of Marine Products Within the Country: No detailed or accurate information is available on the utilization of marine products within Korea. The Office of Marine Affairs states that of the total catch of 403,000 tons in 1957, 11,000 tons were exported and 392,000 tons consumed domestically in the form of fresh or processed products. Of the 8,800 tons of canned products, 95 percent was consumed by the Korean military forces; 4.8 percent was sold on domestic markets; and the balance of about 0.2 percent was exported. Statistics show that there was a limited production of fertilizer from fish, probably less than 100 tons. Some locally-produced shell is used in the manufacture of cheaper inlaid lacquer products, but for specialty and export items a finer shell is imported.

Marine Products Processing Industry: A total of 65,270 tons of processed fishery items was produced by Korea in 1958, including 62,851 tons of food products and 2,419 tons of nonfood items.

In 1958 Korea had 38 marine products canneries licensed by the Office of Marine Affairs. The total capacity of these plants is estimated at 35 million cases or about 52,000 metric tons. Most of the plants are said to be equipped with modern facilities. The daily capacities of the individual plants vary from a minimum of 300 cases to a maximum of 1,350 cases for an 8-hour day. During 1958 two model plants were erected with about $325,000 of FY 1954 UNKRA funds. The capacity of each plant was estimated at 75,000 tons for an 8-hour day, 20 days a month, 6 months a year.

Production of canned marine products in 1958 amounted to 593,277 cases (8,855 tons). Of this

Korea (Contd.):

Table 4 - Korean Fishery Products Cured and/or Processed

Commodity	1958	1957	1956
	(Metric Tons)		
Food			
Canned	8,855	8,487	8,810
Sun-dried	12,512	12,322	8,434
Salted and dried fish	2,068	2,867	2,426
Products fermented in brine	14,619	19,233	16,622
Salted fish	12,326	14,246	13,591
Boiled & dried	9,063	8,867	8,412
Edible seaweed	3,408	5,088	4,616
All others	-	30	25
Total	62,851	71,140	62,936
Nonfood			
Fish oil	353	237	624
Seaweed	1,976	2,642	2,053
Others	90	8	59
Total	2,419	2,887	2,736

total 92 percent consisted of three items: horse mackerel or bluefin tuna, saury or mackerel-pike, and fish balls.

Agar-agar Production: South Korea has 45 natural agar-agar plants of which only 25 operated during 1958 with a total production of 250 metric tons. Three synthetic agar-agar plants, financed with $635,000 of 1955 ICA funds, produced a total of 109 tons. Agar-agar is not included in the processed products totals issued by the Office of Marine Affairs.

Production of Frozen Fish Products: Korea has 67 ice-freezing and cold-storage plants with the following daily capacities: ice making 1,557 metric tons; freezing 275 tons; cold-storage 8,415 tons; and ice storage 23,652 tons. Although the Office of Marine Affairs lists production of frozen marine products as 10,327 tons of fish and 90 tons of shrimp, only about 33 percent of this amount was quick-frozen, the remainder being merely stored in ice or cold-storage plants. The quick-frozen products were produced in 27 plants with a combined capacity of 275 tons per day. The Office of Marine Affairs does not include frozen products in its statistics on processed products.

Production of Fish Oil: Korea's 42 fish-oil plants are all quite small, having a combined annual capacity of only 700 tons. These plants produced 353 tons of fish oils in 1958.

Foreign Trade in Marine Products: Exports of marine products from Korea during 1958 totaled 11,048 tons, 12.3 percent greater than in 1957. These products were valued at US$3,670,374, 6.8 percent more than 1957 fishery export sales and 22 percent of the total value of all exports from Korea in 1958. The disproportionate increase in quantity compared to the lesser increase in value of exports was attributed to a drop in foreign market prices for Korean marine products, as also happened in 1957.

Japan was the largest importer of Korean fishery products taking 7,789 tons worth $2.3 million, followed by Hong Kong with 2,891 tons worth $1 million. These two markets combined purchased 97 percent by volume and 91 percent by value of Korea's fishery exports. The United States was the third largest buyer with 301 tons worth $285,000 followed by Singapore--35 tons worth $28,000 and the Republic of China--28 tons worth $8,500. England, Australia, West Germany, Italy, and the Ryukyus, in that order, were markets for insignificant amounts of Korean marine exports.

International Problems: Korea's differences with Japan over the "Rhee or Peace Line" remain unsettled. This line, established by presidential proclamation on January 18, 1952, closes off waters ranging from 10 to 200 miles off the Korean coast. Purportedly it is designed for : (1) fishery conservation; (2) protection of Korea's security; (3) protection of mineral resources of the contin-

Table 5 - Korean Quantity and Value of Fishery Exports by Commodity 1/

Commodity	1958		1957		1956	
	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000
Frozen & fresh fish	2,576	713	3,311	693	3,103	554
Frozen shrimp	59	73	20	20	-	-
Dried shrimp	9	12	318	90	13	17
Dried anchovy	-	-	48	22	-	-
Dried cuttlefish	4,433	1,427	2,943	1,229	307	110
Dried oyster	12	11	40	41	40	33
Other dried fish	39	38	110	100	176	142
Salted and boiled fish	-	-	5	3	-	-
Laver 2/	8	41	21	91	150	601
Agar-agar	266	634	227	586	336	820
Fish-liver oils	369	147	119	67	27	30
Inedible seaweeds	2,995	424	2,484	378	1,980	482
All others	280	148	189	114	162	111
Total	11,048	$3,670	9,837	$3,435	6,298	$2,899

1/Figures may not add up to total because of roundings.
2/The figures shown above for laver exports in 1957 are 189 tons and $810,000 less than were shown in report of that year. This amount of laver was shipped to Japan and originally included in the 1957 export statistics. However, the laver was not released from Japanese customs warehouses and payment effected until 1959. Therefore the 1957 export figures were reduced by that amount. Presumably this tonnage and value will be shown in export statistics for 1959.

Korea (Contd.):

ental shelf. Korea continues to seize Japanese fishing vessels and crews found within this line.

As in previous years, a number of Korean fishermen and their vessels were seized in 1958 by Communist gunboats operating out of harbors in North Korea. It is believed that most of these fishermen were released after some subjection to Communist propaganda.

As a result of the controversy over the repatriation to north Korea of Korean residents in Japan, the Republic of Korea suspended trade relations with Japan effective June 15, 1959. Since approximately 64 percent of Korea's exports of marine products in 1958 went to Japan, this move was particularly distressing to the fishing industry. Following the trade suspension there was speculation about the establishment of a three-way trade arrangement--between Japan and Korea through the Ryukyus--but there have been no developments along this line.

In the latter part of July the Fresh Fish Exporters Association requested the Korean Ministry of Commerce and Industry to allow the exportation of fresh fish to Japan, pointing out that the export to areas other than Japan was "impossible" and that certain fishermen were being hard hit by the suspension. According to the Association, unfilled contracts for $1 million worth of Korean fresh fish had already been signed with the Japanese.

Government Policy and Program for Fisheries Industry: The fishery industry of Korea is of traditional importance as the nation's chief source of animal protein and an important source of foreign exchange earnings. The industry has been hampered however by the destruction suffered in World War II and, particularly, in the Korean War; antiquated equipment and outdated, inefficient fishing techniques; lack of financing and credit systems for operations and investment; undeveloped marketing, processing and distribution systems for fisheries products; excessive taxes, charges, and other costs; and, a lack of technical staff.

Since 1953 progress in the development of the industry has been encouraging. This progress has been made possible largely by the aid provided by the United Nations and the United States in support of the Korean program for rehabilitation and expansion of the fishing industry. This aid has taken the form of boat construction, conversion, and repair; the introduction and demonstration of improved gear and fishing techniques; the construction of better marketing facilities; training in sanitation and the handling and freezing of products; the training of fishermen and technicians; the exploration of fishing resources; and, the establishment of a revolving loan fund for financing seasonal operations of the local guilds and individual fishermen. As a result of these activities, production from Korean coastal and offshore fisheries rose from an annual average yield of 293,000 tons for 1945-54 to 341,000 tons in 1956 and 403,158 tons in 1957. Discounting the slight drop in 1958 from the previous year, there has been a steady increase in production since 1953.

Faced with the increasing food demands of a growing population and the desire to increase exports of marine products, the Government has established a policy aimed at protecting fishing resources, increased production at lower costs, and expansion of foreign markets. Resources are to be guarded by means of better management and strict control over fishing operations in territorial waters. Further exploratory work is to be carried out to locate fish resources. The design and construction of fishing vessels are to be modernized and the use of improved gear encouraged. Available financial assistance will be increased and loan procedures simplified. Exports are to be encouraged by the establishment of quality standards backed by inspection and enforcement procedures. The advice and assistance of the U. S. Operations Mission is being utilized in the achievement of these goals.

The Government continues to assist in the expansion of production from aquiculture and is assisting in the development of inland fishery resources.

While progress toward the established goals is being made, the rate of advance is restricted by limited financial means.

Liberia

FISHERIES TRENDS, OCTOBER 1959:

A Liberian fishing company now operates six fishing vessels, and is in process of expanding operations to Sierra Leone and Nigeria. It is understood that a branch office is being opened in Freetown, Sierra Leone, and that two of the six vessels will contribute to supplying fish to that outlet. Operations of another firm in which the company has an interest are also reported to be progressing in Nigeria.

Interest in the fish pond program, sponsored by the U. S. International Cooperation Administration and the Liberian Department of Agriculture and Commerce, which is designed to make freshwater fish available to supplement the Liberian natives' protein-deficient diet, is slowly increasing. Requests for assistance in construction of fish ponds are being received in larger numbers, and several new fish ponds are currently under construction (United States Embassy in Liberia, October 9, 1959).

Martinique

IMPORTS OF FISHERY PRODUCTS UNDER LICENSE INCLUDED IN 1959 DOLLAR CREDITS:

In 1959, import allotment figures for dollar and sterling credits were increased from US$3,640,000 (both dollar and sterling) available in 1958 to US$5,125,408. For 1959, the dollar and sterling allotments were lumped into one sum, which can be used to buy either from dollar or sterling zones. Included in the listings of licensed importations is 58 million francs (US$118,400) for fresh, salted, or canned fish. (United States Consulate dispatch from Martinique dated October 19, 1959.)

Mexico

CANNED FISH PACK, 1958:

The 25 Mexican canneries, reported to have operated entirely or in part on fishery products in 1958, packed an estimated 686,000 cases, or about 255,000 cases more than during 1957. The greatest increase was in the pack of California sardines which jumped from an estimated 155,000 to 334,000 cases. Canned shrimp, tuna, and mullet also showed significant increases. The total pack was estimated to have a value of 112,700,000 pesos (US$9,016,000). Canned sardines, shrimp, abalone, and tuna and tunalike fish comprised about 93 percent of the value of the canned fishery products.

Table 1 - Mexico's Canned Fishery Products Pack, 1957-58

Product	Quantity		Value
	1958	1957	1958
	. . . (Cases) . . .		US$
Sardines (15-oz. 48 cans/cs.)	334,000	155,000	1,000 3,504
Abalone (16-oz. 48 cans/cs.)	106,000	105,000	2,072
Shrimp (about 11.1-oz. 48 cans/cs.)	96,000	60,000	1,904
Tuna & tunalike fish (7-oz. 48 cans/cs.)	2/80,000	12,500	904
Mullet (about 11.1-oz. 48 cans/cs.)	30,000	10,000	216
Mackerel (16-oz. 48 cans/cs.)	25,000	70,000	208
Miscellaneous1/	15,000	18,000	208
Total cases	686,000	430,500	9,016

1/ Includes miscellaneous fish and shellfish, turtle meat, and specialty items.
2/ Includes an estimated 30,000 cases of yellowtail.

During part of the year Mexican canned sardines were exported to the United States. The canned abalone market, mostly export, remained soft which discouraged any expansion in that fishery. There was a slight reduction in the number of operating plants owing to purchase and consolidation.

Normally, with the exception of abalone, canned fishery products are for local consumption. In 1958 as in 1957, however, some sardines were canned for export to the United States. (It is understood that this was done on a barter arrangement in part payment for fishing vessels secured by a cannery in Mexico from one in the United States.)

Of the 25 canneries that were reported to have processed sea food during 1958 more than half (13) were located in Baja California. Sinaloa ranked next with 5 and Veracruz followed with 2. The remainder were scattered about the Republic, along the coast, and on the central plateau. Nineteen of the canneries were on the West Coast, 3 on the East Coast, and 3 in the center of the country. Some were dedicated exclusively to fishery products while others, principally those in the highlands, worked only part-time on sea foods.

The more important species canned in Mexico are: California sardines (Sardinops caerulea), Pacific mackerel (Pneumatophorus diego), jack mackerel (Trachurus symmetricus), yellowfin tuna (Neothunnus macropterus), skipjack tuna (Katsuwonus pelamis), yellowtail (Seriola dorsalis), mullet (several species of Mugil), Spanish mackerel (several species of Scomberomorus), abalone (3 species of Haliotis), and shrimp (4 species of Penaeus).

The 1958 California sardine pack ranked first in quantity and in value. It was more than double the quantity canned in 1957. Fish were more readily available in 1958 and the plants obtained better fishing equipment. January was a good month but then fish became scarce until July. About two-thirds of the pack was made during the last half of the year. The type of pack depends primarily on the packer's estimate of demand. In

Mexico (Contd.):

1958 about 72 percent of the pack was one-pound ovals in tomato sauce. This was a considerable increase over the 1957 pack. Likewise, there was an increase in the percentage of one-pound natural pack, but the 6-ounce natural cylindrical can declined appreciably.

Foreign Trade: Imports of all fishery products by Mexico during 1958 were valued at about $588,000 with European sardines accounting for about 70 percent of the value of imports. The United States share of the fishery imports was less than 5 percent and amounted to only about $27,000.

Exports of canned fishery products were valued at about $1,887,000. Practically all, 99.9 percent by value, of the 1958 exports were shipped to the United States. Abalone accounted for about 92 percent of the value of Mexican canned fishery products exports. (United States Embassy dispatch from Mexico dated October 10, 1959.)

Note: Values converted at rate of 12.50 pesos = US$1.

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CUBAN FISHING VESSELS BARRED FROM PORT OF ISLA MUJERES:

The Commander of the Isla Mujeres, Quintana Roo Naval Base and former Chief of Staff of the Mexican Navy, has announced that Cuban fishing vessels will no longer be permitted free use of that port. Only vessels entering under protest resulting from bad weather, damage to the vessels, or illness of the crew will be allowed entry.

For many years Cuban fishing boats have entered Isla Mujeres for shelter and for supplies. These boats fish principally for groupers and snappers which they discharge in Cuba. Some are fitted with extensive live-wells while others follow the conventional pattern of preserving the fish in ice (United States Embassy in Mexico City, October 6, 1959.)

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ENSENADA AREA FISHERY TRENDS, SEPTEMBER 1959:

The abalone landings in the Ensenada, Mexico, area through August this year have been normal but, according to the Fisheries Inspector's Office, the tuna catch was 30 percent below normal, not because of lack of fish, but because of the poor market. The prices offered for tuna in the United States have dropped drastically. The only firm in Ensenada, reported to be engaged in tuna canning as an industry, has had to cut the pay of its fishermen.

The spiny lobster season opened on October 1 and continues until March 15, 1960. The Regional Federation of Fishing Cooperatives, consisting of 10 fishing cooperatives in Ensenada, now will sell spiny lobsters through the bank to a United States firm for 50 cents a pound in contrast to the previous 45.5 cents a pound which it has received for the last 5 years from another firm. The money paid by the purchaser will go to the bank to pay off a debt of approximately 9 million pesos (about US$720,000) which the cooperatives owe for a loan made in the past for purchase of equipment.

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EXPORT DUTY ON FISH MEAL LOWERED:

Effective October 23, 1959, the Mexican export duty on fish meal will be one-third less than previously. The new export duty will amount to about US$8.16 per gross metric ton, which is about US$4.08 under the previous rate. The change in rate was effected by decreasing the ad valorem from 30 percent to 20 percent. The official price, upon which the ad valorem is calculated, remains the same at 0.50 pesos per gross kilogram (about US$40 per metric ton).

Most of Mexico's fish meal production comes from the Peninsula of Baja California. The 1958 production of fish meal was about 2,735 metric tons of which less than ten percent (216 tons) was exported--all to the United States. It is not expected that the new duty will increase appreciably the exports of fish meal because Mexico is deficient in this commodity. Imports of fish meal in 1958 a-

Mexico (Contd.):

mounted to 3,621 metric tons, states a United States Embassy dispatch (October 20, 1959) from Mexico.

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SHRIMP FISHERY TRENDS, SEPTEMBER 1959:

The Mexican northwest Pacific Coast shrimp season opened on September 16 after two months' closure. The Guaymas fleet set sail on this date, but the Mazatlan vessels, owing to small size of shrimp and cooperative disputes, did not begin fishing until some 10 to 12 days later. The Guaymas landings were very good with many vessels reporting 4-6 tons of shrimp tails per trip. Landings flooded the Guaymas freezers and surplus fresh shrimp were trucked to Mazatlan for processing. First reports from Mazatlan indicated good catches there also. Bay fishing, however, was reported as spotty. This suggests the possibility of a decline in catches later on. Normally, bay catches should be running high at this time of year.

In the Gulf of Mexico, near Tampico, two Texas shrimp vessels were seized late in September by Mexican patrol boats. Vessels and crews were released upon posting cash bonds of 20,000 pesos in one instance and 25,000 pesos in the other (about US$1,600 and 2,000 respectively). The catch and fishing gear were condemned. These two seizures and one in late August are the first in about three years.

The Carmen-Campeche September catches in the Gulf of Mexico were about the same as August with Carmen landings averaging slightly under one ton of headless shrimp per trip and Campeche landings about 1,500 pounds per trip. The September landings in both Carmen and Campeche showed an increase in the proportion of brown shrimp over August. Pink shrimp still remained the dominating species in both ports. Shrimp sizes increased somewhat during the month. About 75 percent of the Campeche and 50 percent of the Carmen landings ran 26 to 30 count per pound or under. The sizes tended to increase as September progressed, according to an October 2, 1959, dispatch from the United States Embassy in Mexico City.

Netherlands

INCREASE IN WHALE PRODUCTION PLANNED:

The Dutch whaling fleet, owned by the Netherlands Whaling Company of Amsterdam, is expected to try for a record catch during the coming season. The fleet departed for Antarctic whaling grounds on November 1, 1959. Since the company is no longer bound by the rules established by the 1946 International Whaling Convention, from which Holland together with Norway withdrew on June 30, 1959, it has reportedly fixed its own limit at 1,200 blue-whale units. This means a production target of approximately 24,000 metric tons of whale oil for 1959 as compared with 18,800 tons produced from the 1958 catch of 969 units. In order to supply fuel oil and transport the whale oil, two tankers were added to the fleet, which consists of the 26,830-ton whaling ship Willem Barendsz and 13 catchers. The fleet, which expects to start operations in the Antarctic in mid-December, will operate 107 days instead of 69 days as in previous seasons. In contrast to previous seasons, no specific effort will be made to catch sperm whales.

The Willem Barendsz carries a new freezing plant which will enable it to fulfill its contract with a United Kingdom firm to furnish 1,500 tons of frozen whale meat a year.

For several years the Dutch biologists have argued that the supply of blue whales in the Antarctic is larger than generally supposed, and the Dutch have argued for an increased limit. The Netherlands has demanded a quota of 8 percent of the total catch, but other countries have insisted on a quota of 4.6 percent for the Dutch.

According to the Dutch, six Japanese whaling fleets will join Antarctic whaling operations in November, with a target of 5,040 blue-whale units. Britain will send three whaling fleets which are expected

Netherlands (Contd.):

to catch 2,500 blue-whale units. Norway (with 8 fleets) had demanded a 33-percent share of the 15,000 units, or 5,000 units, and it has announced its intention of increasing that catch by some 800 units. The Dutch expect Soviet Russia to abide by its original share of 3,000 units. The Russian whaling fleet, headed by the new 36,000-ton mothership Sovetskaya Ukraine, left Odessa in mid October, according to a Russian news bulletin.

One difficulty has arisen in connection with the signing-on of the crew for the Willem Barendsz. During a meeting on October 21 at the Center for Seamen of the Merchant Marine and the Fishing Fleet, the Center's chairman advised personnel of the whaling fleet not to sign their contracts with the Netherlands Whaling Company pending approval of the contracts by the Netherlands Government Board of Mediators. In April of this year the Center had agreed to a request received from the Company to negotiate for changes in the labor agreements with the company's workers, if the Netherlands were allotted less than 1,200 blue-whale units by the International Whaling Convention. The Center has believed that there is no reason to alter the labor conditions now that the Netherlands has withdrawn from the Convention and has fixed its catch limit at 1,200 units. The chairman stated that notwithstanding this fact the Company now wants to reduce the earnings of its personnel by about ten percent. As a result of these negotiations it may be possible that the Willem Barendsz may be delayed in sailing from Amsterdam.

The Willem Barendsz has many provisions for the comfort, safety, and welfare of the 500-man crew during the long six months Antarctic voyage. The ship has a modern 12-bed hospital and operating room. The wife of the ship's doctor, who accompanies her husband, conducts regular church services and performs other chaplain duties. Current entertainment films are available for frequent showings and a well-stocked library supplies adequate reading material to suit the taste of the men. Living quarters of the ship are attractively decorated featuring paintings and photos reminiscent of Holland. (The United States Embassy in The Hague, October 20, 1959, and United States Consul in Amsterdam, October 23, 1959.)

New Zealand

RESTRICTIONS REMOVED ON SOME IMPORTS FROM THE UNITED STATES:

For the first time in the postwar period, most discriminatory restrictions on imports from dollar sources have been removed, opening the New Zealand market in 1960 to dollar goods on an equal basis for all products except motor vehicles and timber. United States firms will now be able to compete on more equal terms with other suppliers.

New Zealand's exports to the United States have about doubled in the last two years and resulted in a substantial surplus in New Zealand's balance of payments with the United States. The current liberalization of trade with the dollar area will probably result in an expansion of imports from the United States. Among the items granted increases in quotas are canned and preserved fish, according to a United States Embassy dispatch (October 9, 1959) from Wellington.

Nigeria

SURVEY OF TUNA STOCKS BY UNITED STATES COMPANY PROPOSED:

The West African program of the Rockefeller Brothers Fund includes a plan to arrange for a detailed survey of the tuna stocks in the Atlantic Ocean off the Nigerian coast by a United States tuna cannery company. Such a survey would necessarily include a study of the availability of bait nearer the shore. According to reports, the United States company has already agreed with the Ghanaian Government to conduct a survey off Ghana. Extension of the area to be surveyed to Nigeria would be relatively

Nigeria (Contd.):

inexpensive. (United States Consul in Lagos, September 1959.)

Norway

FISHERIES TRENDS, SEPTEMBER 1959:

A total of 1,013,000 metric tons of fish was landed in the period from January 1 to September 19, 1959, as compared with 969,000 and 1,395,000 metric tons during the same periods of 1958 and 1957, respectively. The fish-processing industry, particularly filleting and freezing companies, became increasingly concerned over the small quantity of fresh fish supplies in relation to production capacity. According to a Government source, the industry is considering the acquisition of additional fishing vessels and equipment. Norway's participation in the Iceland herring fishery is growing, and the industry is being encouraged by the Government to fish for more herring in the North Sea.

The long-standing dispute over "ex-vessel" prices of fish between Norges Raafisklag, the fishermen's marketing organization in North Norway, and Norsk Frossenfisk A/L, the principal purchaser of fresh fish for filleting and freezing, has been settled--at least for the time being. Norges Raafisklag agreed to comply with the directives of the Government on prices of fish for filleting and freezing and also honored the terms of the agreement it had with Norsk Frossenfisk A/L concerning the price of fish delivered during the summer months. (United States Embassy report from Oslo dated October 20, 1959.)

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QUOTA FOR 1959/60 WHALING SEASON ESTABLISHED:

According to press reports from Sandefjord, the headquarters of Norway's whaling industry, the whaling quota for the 1959/60 Antarctic whaling season will be 5,800 blue-whale units, which is equivalent to the 1958/59 season's catch. The Government has not yet formally established the quota, but it is believed that the quota will undoubtedly be set at that figure.

The whaling industry has reportedly reached an agreement under which eight expeditions will participate in the 1959/60 Antarctic season, or one less than last year. The six large expeditions will be allocated a quota of 705 blue-whale units each, and the two smaller expeditions, 585 units each. An unallocated balance of 400 blue-whale units will be distributed during the course of the season. The large expeditions will operate with a maximum of nine catchers and the smaller expeditions with eight catchers. The Norwegian whaling fleet was due to depart for the Antarctic during the latter part of October and the early part of November.

Pakistan

MAIN FEATURES OF THE NEW FISH HARBOR COMPLETED:

The main features of the new fish harbor at Karachi, Pakistan, were completed by the end of September 1959. With the completion of the jetty and the fish market it was possible to hold a formal inauguration on October 2. Full utilization of the new facilities will not be possible, however, until (1) dredging operations are completed to permit use of the dock at low tide; and (2) the Karachi Fishermen's Cooperative Society, which has been entrusted with the operation of the harbor, obtains the necessary auctioneers, accountants, and other administrative personnel.

Peru

EXPORTS AND IMPORTS OF MARINE-ANIMAL OILS, 1957 AND 1958:

Peru's foreign trade in marine-animal oils is largely confined to exports of oils derived from the whaling and the fishery for sardine-like fishes for reduction into fish meal and oil.

Peru (Contd.):

In 1957 close to 8,828 metric tons of marine oils were exported to western Europe and the United States. The United States was Peru's best customer for sperm oil--about 2,742 tons or 61.8 percent out of the total exports of 4,435 tons in 1957.

Table 1 - Peru's Exports of Marine-Animal Oils by Country of Destination 1957 and Total 1958

Commodity and Country of Destination	1957	1958 1/
	(Metric Tons)	
Whale oil, refined:		
United States	55.5	-
Total	55.5	-
Sperm oil:		
United States	2,741.9	-
Germany	1,050.0	-
Netherlands	643.5	-
Total	4,435.4	7,352.2
Fish oil:		
Netherlands	2,245.6	-
Germany	1,165.0	-
Norway	586.0	-
Italy	200.8	-
Sweden	112.1	-
Belgium	28.0	-
Total	4,337.5	1,643.3

1/Estimates; breakdown by country of destination unavailable.

Imports of marine oils by Peru in both 1957 and 1958 were nearly all cod-liver oil from Norway. Small quantities of refined whale oil, fish oil, and cod-liver oil were imported from the United States in 1957.

Table 2 - Peru's Imports of Marine-Animal Oils by Country of Origin 1957 and Total 1958

Commodity and Country of Origin	1957	1958 1/
	(Metric Tons)	
Whale oil, refined:		
United States	4.1	-
Total	4.1	5.6
Cod-liver oil:		
United States	1.8	-
Norway	135.4	-
Other	1.7	2/
Total	138.9	86.9
Fish oil:		
United States	2.3	-
Total	2.3	-

1/Estimates; breakdown by country of destination unavailable.
2/Includes 9.0 tons of fish-liver oil.

Duties assessed by Peru on imports of marine oils are divided into specific duties per gross kilo, ad-valorem duties on c.i.f. value, and percentage charges over ocean freight.

Peru's production of sperm oil in 1957 recovered slightly and totaled 4,491 tons, about 5 percent more than in 1956.

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EXPORTS OF MARINE PRODUCTS, JANUARY-JUNE 1959:

Exports of principal marine products by Peru, January-June 1959, amounted to 153,975 metric tons (valued at US$20.2 million). Exports for the first six months of this year amounted to 95.2 percent of the 1958 annual total of about 161,658 tons. Fish meal exports continued to expand, with the January-June 1959 exports of 123,580 tons exceeding the 12-months 1958 total (105,777 tons) by 16.8 percent.

Peruvian Exports of Principal Marine Products, January-June 1959

Marine Products	2nd. Quarter 1959			First Half 1959		
	Qty.	Value 1/		Qty	Value 2/	
	Metric Tons	Million Soles	US$ 1,000	Metric Tons	Million Soles	US$ 1,000
Fish meal	72,522	234.0	8,439	123,580	390.7	14,524
Fish, frozen, canned, etc.	11,430	66.8	2,409	17,208	116.4	4,327
Fish oil	5,625	13.5	487	6,926	16.9	628
Sperm oil	282	0.9	32	4,031	13.6	506
Whale meal	827	2.3	83	1,825	5.4	201
Fertilizer (Guano)	-	-	-	405	1.0	37
Total	90,686	317.5	11,450	153,975	544.0	20,223

1/F.o.b. values converted at rate of 27.73 soles equal US$1 for 2nd quarter of 1959.
2/F.o.b. values converted at rate of 26.99 soles equal US$1 for first half of 1959.

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FISHERIES PRODUCTION EXPANDS RAPIDLY:

The rapid development of Peru's fisheries resources was brought to world attention in September when at the First

Table 3 - Peruvian Duties on Imported Marine Oils in Effect 1958

Tariff No.	Item No.	Commodity	Specific Duty		Ad-Valorem (Percentage c.i.f. Value)	Percent Over Ocean Freight Charges
			Soles per Gross Kg.	US$ Per Kg.		
96	365	Whale oil, refined	0.60	2.19	15.667	2
96	366	Whale oil, unrefined	0.375	1.37	15.667	2
96	367	Cod-liver oil	free	-	13.667	2
96	368	Fish-liver oils	"	-	13.667	2
96	369	Fish oil	2.25	8.21	13.667	2

Peru (Contd.):

International Oceanography Congress held in New York City it was announced that Peru had jumped from 26th to 5th place among fish-producing countries of the world in the short period of three years. The poor Norwegian herring catches in 1957 and 1958 were a factor in this expansion because Peru, with its abundance of marine life, was in a position to fill the shortages thus created. Great strides continue to be made in the Peruvian industry. Exports of principal fish and fish products were valued at US$20.7 million in 1958 and in the first half of 1959 were valued at just about the same amount ($20.1 million).

Peruvian Exports of Principal Fish and Fish Products, January-June 1958-59

Product	January-June	
	1959	1958
	(Metric Tons)	
Canned bonito	7,727	5,849
Fish meal	123,580	49,803
Frozen tuna	7,210	3,674
Frozen skipjack	1,643	983
Sperm oil	4,031	4,275
Fish oil	6,926	1,050

The principal product exported in both quantity and value in 1958 and the first half of 1959 was fish meal, which made up 80 percent of the volume and 72 percent of the value in the latter period.

The expanding fishing industry has prompted at least three port cities to consider it a possible source of revenue through taxation. Peruvian Senate support is forecast for a S/10 to S/20 (about 36 and 71 U. S. cents) per ton tax on fish meal processed in Callao for export. A 6-percent tax on fish meal and fish oil processed in Chimbote and Casma (9 percent for plants not processing fish oil) is proposed by a bill presented in the Chamber of Deputies.

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RESTRICTIONS ON FISH MEAL PLANT EXPANSION MODIFIED:

The Government of Peru has issued a decree (October 9, 1959) abolishing its general restriction on the establishment of additional fish meal plants. It was concluded that the large catches of fish for existing plants had not reduced the supply of fish in the waters off the Peruvian coast. The new decree provides for the establishment of certain closed seasons by the Ministry of Agriculture and designates three major zones where no additional plants may be established nor expansion of existing plants permitted.

Portugal

CANNED FISH EXPORTS, JANUARY-JUNE 1959:

Portugal's exports of canned fish during January-June 1959, amounted to 32,626 metric tons (1,798,000 cases), valued at US$16.5 million as compared with 26,959 tons, valued at US$14.6 million for the same period in 1958. Sardines in olive oil exported during the first six months of 1959 amounted to 23,821 tons, valued at US$11.6 million.

Portuguese Canned Fish Exports, January-June 1959

Species	Jan.-June 1959	
	Metric Tons	US$ 1,000
Sardines in olive oil	23,821	11,582
Sardine & sardine-like fish in brine	998	200
Tuna & tunalike fish in olive oil	1,183	836
Anchovy fillets	3,296	2,301
Mackerel in olive oil	2,032	1,004
Other fish	1,296	625
Total	32,626	16,548

During January-June 1959, the leading canned fish buyer was Germany with 7,457 tons (valued at US$3.7 million), followed by Italy with 4,132 tons (valued at US$2.2 million), Great Britain with 2,963 tons (valued at US$1.4 million), United States with 2,857 tons (valued at US$2.0 million), and Belgium-Luxembourg with 2,305 tons (valued at US$1.1 million). Exports to the United States included 1,426 tons of anchovies, 104 tons of tuna, 1,242 tons of sardines, and 28 tons of mackerel. (Conservas de Peixe, August 1959.)

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CANNED FISH PACK, JANUARY-JUNE 1959:

The total pack of canned fish for January-June 1959 amounted to 12,325 metric

Portugal (Contd.):

tons as compared with 12,619 tons for the same period in 1958. Canned sardines in oil (5,200 tons) accounted for

Portuguese Canned Fish Pack, January-June 1959		
Product	Net Weight	Cases
	Metric Tons	1,000
In Olive Oil:		
Sardines	5,200	273
Sardinelike fish	468	24
Anchovy fillets	3,257	325
Tuna	2,691	96
Mackerel	185	7
Other species	524	27
Total	12,325	752
Note: Values unavailable.		

42.2 percent of the January-June 1959 total pack, down by 23.7 percent from the pack of 6,818 tons for the same period of 1958, the August 1959 Conservas de Peixe reports.

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FISHERIES TRENDS, JANUARY-JUNE 1959:

Sardine Fishing: During January-June 1959, the Portuguese fishing fleet landed 17,087 metric tons of sardines (valued at US$1,695,582 ex-vessel or about $99.23 a ton).

June 1959 landings of sardines totaled 6,279 tons valued at US$617,948. Canneries purchased 34.5 percent or 2,164 tons of the sardines (valued at US$222,609 ex-vessel or about $102.87 a ton) during June 1959. A total of 4,114 tons was purchased for the fresh fish market, and 1 ton was salted.

Other Fishing: The January-June 1959 landings of fish other than sardines were principally 12,476 tons of chinchards (value US$788,069) and 1,076 tons of anchovies (value US$104,835). (Conservas de Peixe, August 1959.)

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EXPORTS OF CANNED SARDINES TO ALL DESTINATIONS AND TO WEST GERMANY, 1954-58:

Portugal's exports of all packs of canned sardines (exclusive of sardinelike fish) to West Germany in 1958 amounted to 11,783 metric tons, or 23.9 percent out of a total of 49,229 tons exported to all destinations.

Table 1 - Portuguese Exports of Canned Sardines1/ to All Destinations and to West Germany, 1954-58

Years	Total Exports		West Germany	
	Quantity	Value	Quantity	Value
	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000
1958	49,299	25,480	11,782	6,242
1957	40,027	23,493	7,939	4,674
1956	47,167	27,234	8,827	5,079
1955	51,502	25,209	12,564	6,150
1954	42,411	21,613	9,491	4,843

1/Includes all sardine packs but not sardinelike fish such as anchovies.
Source: Commercio Externo, 1954-58.

West Germany in 1954-1958 increased its imports of boneless and skinless sardines, and is taking a larger share of whole sardines in olive oil. On the other hand, imports of sardines in sauces other than olive oil decreased during those years. (United States Consulate in Oberto, July 17, 1959.)

Table 2 - Portuguese Exports of Canned Sardines by Type of Pack to All Destinations and to West Germany, 1954-58

Years	Total Exports		West Germany	
	Quantity	Value	Quantity	Value
	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000
Skinless and boneless:				
1958	5,035	3,859	1,890	1,430
1957	4,245	3,464	1,104	877
1956	4,091	2,612	968	619
1955	4,281	2,084	706	346
1954	3,332	1,699	629	319
Whole sardines in olive oil:				
1958	33,603	16,398	8,734	4,245
1957	24,894	13,919	5,123	2,864
1956	31,591	18,098	5,677	3,213
1955	33,678	16,506	9,355	4,580
1954	27,805	14,163	5,869	2,997
Whole sardines in sauces (other than olive oil):				
1958	10,662	5,223	1,158	567
1957	10,887	6,109	1,712	933
1956	11,484	6,524	2,183	1,246
1955	13,543	6,618	2,503	1,224
1954	11,275	5,751	2,993	1,527

Note: Values converted at rate of 28.75 contos = US$1.
Source: Commercio Externo, 1954-58.

* * * * *

COD-FISHING FLEET HAS POOR SEASON:

The 48 Portuguese cod line-fishing vessels turned to the Newfoundland Banks fishing areas (late in September) after spending some days in port due to hurricane warnings. The fleet at that time was short of a full catch by about 17,000

Portugal (Contd.):

metric tons of fish and reflected the general shortage of cod on the Newfoundland and Greenland banks. The poor catch was of great concern to the Cod Fishing Shipowners Guild in view of the relatively poor catch in 1958.

Late in October the cod-fishing fleet continued to find fishing poor and bad weather aggravated the situation. The Guild announced that due to the poor weather conditions the fleet expected to return to Portugal. Very few of the vessels reported satisfactory catches.

Due to the poor catch this season, and the anticipated short supply of salt cod in future months, some instances of sales above the legal maximum prices were reported, state United States Embassy dispatches from Lisbon dated October 8 and 22, 1959.

* * * * *

EMBARGO ON EXPORT OF ALGAE (SEAWEED) LIFTED FOR SINGLE SHIPMENT:

A late summer shipment of 100 metric tons of gelidium (algae used for manufacture of agar-agar) to Japan was permitted by the Portuguese export licensing agency in spite of an embargo on the export of this product.

The Portuguese exporter had justified application for an export license on the grounds that he had that quantity of gelidium immediately available for export and that the Japanese customer was willing to make purchases of similar quantities every year. The Under-Secretary of State for Commerce accordingly ruled (1) that this particular shipment be authorized on an exceptional basis and (2) that a study be undertaken to determine the supplies of gelidium and/or agar-bearing seaweed in Continental Portugal.

Studies have already been completed on supplies of agar-bearing seaweed available in Madeira, Azores, and Cape Verde Islands, but the results have not yet been announced. However, it is understood that results were favorable in Madeira and the Azores and unfavorable in Cape Verde Islands. This may mean some exports of agar-bearing seaweed from Madeira and the Azores may ultimately be permitted.

* * * * *

FUNDS PROVIDED BY GOVERNMENT FOR FINANCING FISHING INDUSTRY PROJECTS:

A Government decree of importance to the fishing industry was published September 21, 1959. Decree-Law No. 42,518 extends the validity of the "Fund for the Renovation and Re-Equipment of the Fishing Industry" and authorizes that Fund to borrow up to 300 million escudos (US$10.5 million) for the financing of projects for the industry included in the Second Six-Year Development Plan.

Neither decree specifies what projects are to be undertaken. However, the Government contribution to the financing of plans for the fishing industry (75 percent of the funds needed) was estimated at 550 million escudos (US$19.25 million), hence the major portion of the Government financing for the fisheries under the Second Plan is provided for by this decree. (United States Embassy dispatch from Lisbon, dated October 1, 1959.)

* * * * *

PROPOSED BARTER DEAL WITH GREECE INCLUDES FISHING VESSELS:

Two directors of a Portuguese tobacco company have visited Greece for preliminary discussions with Greek authorities with a view to signing a barter agreement. The proposed deal, which has not yet been concluded, would involve the exchange of 5,000 tons of Greek tobacco, worth approximately US$7 million, against delivery to Greece of four fishing vessels to be constructed in a Lisbon shipyard. The proposed vessels are to be equipped with installations for the production of oil and fish meal, according to a September 17, 1959, dispatch from the United States Embassy in Lisbon.

Sweden

EXPORTS OF FISHERY PRODUCTS TO EAST GERMANY STOPPED:

Exports of Swedish west and south coast fishery products to East Germany by the Swedish organizations in Goteborg and Karlskrona have ceased because of Sweden's failure to bring in fodder products, brown coal, and grain from East Germany.

Sweden (Contd.):

Exports to and imports from East Germany are specified in the global compensation arrangement for 1959 governing all trade between Sweden and East Germany.

The halt in exports has resulted in difficulties for the two fishing organizations which have been forced to store large quantities of herring. It is estimated that about 4,500 metric tons of herring at present are stored in freezing plants in southern and western Sweden.

About three-quarters of the quantity of herring contracted by East Germany is still not delivered and no mackerel has been exported, in spite of the fact that it was provided for in the contract.

Export shipments to East Germany have stopped at a time when Swedish herring fishing is of considerable volume. The West Coast Fishermen's Central Organization in order to reduce the landings of herring has further limited the quantity of herring that may be landed by each fisherman from 50 boxes per man per trip to 50 boxes per man per week.

The new limitations do not apply on landings in foreign ports and it is therefore hoped that the larger boats will prefer to land their fish in foreign ports.

It is hoped that the fish trade with East Germany will commence again shortly, and in that case Sweden should be able to deliver the total quantity stored at one time. (United States Embassy dispatch from Goteborg, dated October 6, 1959.)

* * * * *

ONE SMALL CANNER STOPS PACKING FISH:

On about October 17, 1959, a small Swedish fish-canning plant located on the Swedish coastal island of Bohus-Malmon was expected to cease the production of canned fish products prepared from sprat, mackerel, and North Sea herring. The closure was caused mainly by the shortage of sprat, the most important raw material of the plant. The irregularity in the supply of other types of fish also played a part in the decision to close the plant.

Under the conditions, the manufacturer claimed that it was impossible to operate the plant satisfactorily at full production capacity.

Turkey

LANDINGS OF AQUATIC PRODUCTS, 1958:

The landings of fish, shellfish, and other aquatic products in Turkey amounted to about 175.8 million pounds. Principal products were: bonito, 46.1 million pounds; anchovies, 20.8 million pounds; freshwater varieties, 34.2 million pounds; and dolphin, 13.2 million pounds.

Turkey's Landings of Aquatic Products, 1958

Products	1,000 Lbs.
Salt-water:	
Anchovy	20,776
Sardines	6,713
Flatfish	6,510
Bonito	46,075
Mackerel	4,462
Horse mackerel (bluefin tuna)	10,754
Tuna	920
Sharks and rays	1,287
Unclassified salt-water	29,845
Total salt-water	127,342
Fresh-water:	
Unclassified	34,220
Shellfish:	
Lobster	650
Mollusks	137
Total shellfish	787
Other:	
Dolphin	13,228
Sponges	213
Total	175,790

Uganda

FRENCH EXPERT TO SURVEY POND FISHERIES:

The Director of the Le Paraclet Hydrobiological Station of the Ministry of Agriculture, France, arrived in Uganda in mid-1959 to advise the Government on increasing the production and expanding the use of fish ponds.

He has taken up the assigment on behalf of the Food and Agriculture Organization (FAO), Rome, Italy, in response to a request by the Government of Uganda.

"Pond fisheries provide one of the most effective ways of increasing animal

Uganda (Contd.):

protein in the human diet," the expert stated in an interview at FAO headquarters before leaving for Uganda. "A well-managed pond can yield about two to three tons of fish per hectare (2,471 acres) per year and, as you know, fish is a rich natural source of protein. It has about the same protein content as fresh meat.

"There are already about 2,000 fishponds in Uganda, ranging in size up to 10 hectares and I hope my work will assist in increasing the productivity of these ponds and lead to the building of more ponds in villages."

The French pond fisheries expert will advise and assist the Government in "determining some of the basic factors affecting the biology of fish ponds and thereby their production of fish." He will also assist in other ways in the development of fish culture in Uganda. Part of his work will be to study methods of fertilization, the role that bottom deposits have in fish production, the sequence of plankton production, and pond management. Much of the French expert's work in Uganda will be based on the experimental fish farm which the Government has established near Kampala.

Union of South Africa

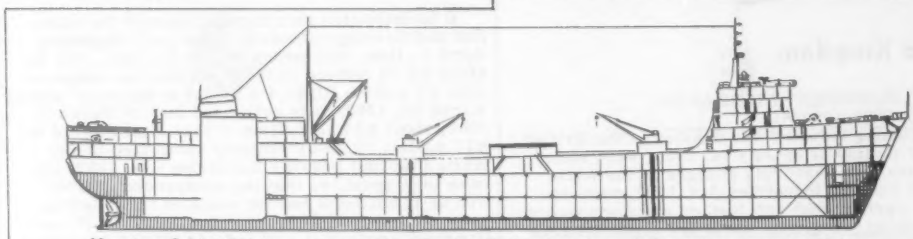
EDIBLE FISH FLOUR PRODUCED ON COMMERCIAL SCALE:

A plant at Dido Valley, Simonstown, Union of South Africa, is producing neutral fish flour for human consumption on an adequate commercial scale. The plant was developed by the South African Fishing Industry Research Institute in cooperation with the fish meal industry. The plant is able to produce more than a ton of edible fish flour a day from pilchard and maasbanker (jack mackerel) meal. Nearly 1,000 tons had been supplied by July 1959 for the enrichment of bread in the western area of the Cape. (The South African Shipping News and Fishing Industry Review, July 1959.)

U.S.S.R.

NEW TYPE FLOATING CANNERY AND MOTHERSHIP FOR HERRING FLEET:

A new type 15,000-ton mothership for Soviet trawlers engaged in herring fishing serves as a combined floating canning plant, supply ship, and repair base. It is said to have a daily production capacity of 400 metric tons of finished and semi-finished products. The hull is all welded and reinforced for ice conditions. A helicopter is used for locating herring shoals. A cinema, library, and reading room are provided for the crew. (United States Consulate dispatch from Goteborg, September 4, 1959.)



New type Soviet floating cannery and mothership for herring fleet--476 feet long; speed 14.5 knots.

* * * * *

PLANS TO INCREASE FLEET OF LARGER FISHING VESSELS FIVEFOLD:

The twin-screw factoryship Sovietskaja Sachalin (9,300 gross tons) was launched in Gdansk, Poland, according to Dansk Fiskeritidende (September 17, 1959), a Danish fishery trade periodical. A sistership, Sovietskaja Litwa, was built and launched earlier in Poland for the Soviet Government.

At the same time the shipyard has delivered a third sistership, Sievierodvinsk, to the Soviets. Each vessel is 508 feet long, 66 feet in breadth, and has a depth of 27 feet. A steam engine of

U.S.S.R. (Contd.):

5,000 hp. gives the vessel a speed of 13 knots.

In this connection, the Russian telegraph bureau, Tass, states that the Soviet Union, within the framework of the current five-year plan, expects to quintuple its fishing fleet of larger vessels. By 1963 there will be built a number of factory trawlers, 279 feet in length, 3,500 gross tons, with an action radius of 60 to 80 days. The freezing capacity of the trawlers will be 30 metric tons of ocean fish each 24 hours.

United Kingdom

FISHING SUBSIDIES AND GRANTS REVISED FOR 1960/61:

The fishing industry was debated in the British House of Commons on July 14, 1959, when statutory instruments covering changes in the White Fish and Herring Industries Act, 1957, were approved, together with two further statutory instruments relating to grants which are made towards the construction of new vessels.

For the second year in succession the Government reduced the subsidy for steam trawlers payable by the White Fish Authority. The cut varies according to the size of the vessel from 5s. to 30s. (about US$0.70-US$4.20) per day. This represents an average reduction of about seven percent in the present subsidies. The Government claimed that at the existing rate of subsidy owners are finding it possible to keep a number of old coal-burning vessels running rather longer than is desirable. This is against the long-term interests of the fishing industry. The cut has been moderated by the fact that certain operating costs have risen and because it is considered dangerous to make too sharp a reduction in coal-burning trawlers at some ports which depend heavily on such vessels for their trade and where employment may be above the average.

At present there are at Grimsby five oil-fired steam vessels built since 1952. They have been built with the aid of grants and loans from the White Fish Authority. The Government announced last year that it intends such vessels to be treated for subsidy purposes in the same way as Diesel vessels of the same size, which receive no subsidy. Last year, the subsidy on the Grimsby vessels was reduced by half with the intention of eliminating it entirely this year. However, because such vessels have been less profitable in the year ended March 31, 1959, than hitherto, instead of eliminating the subsidy immediately the Government will reduce it by half next year.

The Government reduced from £6 10s. per day to £5 per day (US$18.20 to US$14.00) the subsidy for seine-net vessels over 70 feet in length, which normally make voyages of not more than seven days' duration. These vessels are all Scottish. The purpose of reducing the rate is to bring it into line with the rate which applies to motor trawlers of the same size and thus remove the anomaly of having different rates for similar vessels which compete with each other. With the introduction of new types of gear, these vessels of between 70-80 feet are engaging to an increasing extent in both trawling and seining. They can change from one method to the other very easily.

No changes are being made in the herring subsidy, which was instituted in 1957 to arrest the tendency for boats to switch from herring fishing to fishing for white fish. Last year, the profits and earnings in that section of the industry showed some improvement which the Government hopes will result in more boats participating in such fishing.

It is estimated that the total cost of the white fish and herring subsidies in the year beginning April 1, 1960, and ending March 31, 1961, will be about £2.75 million (US$7.7 million) as compared with £3 million (US$8.4 million) in the year ending March 31, 1960. It is estimated that by March 31, 1960, about £15.75 million (US$44.1 million) of the £17 million (US$47.6 million) authorized by the White Fish and Herring Industries Act, 1957, will have been spent, so that the unexpended balance will be insufficient for the needs of the following year. The Act provides that the limit of £17 million may be raised to £19 million (US$53.2 million) with the approval of the House of Commons. This £2 million additional will not cover the industry's needs much beyond the end of the 1960/61 subsidy year, but the Government intends to introduce legislation in the next Parliamentary Session (normally commencing in November) to provide additional funds.

In the light of the Report of the Committee of Inquiry which is looking in detail into the whole question of the future of the fishing industry, the Government will decide whether financial assistance should be extended to the industry beyond the periods authorized by the 1957 Act.

Two further Statutory Instruments approved on July 14, 1959, relate to grants which are made towards the construction of new vessels. They increase the maximum grant which may be paid from £30,000 to £37,500 (US$84,000-$105,000) in the case of white fish vessels, and from £15,000 to £17,500 (US$47,000-$49,000) in the case of herring vessels. These increases are intended to coincide with the increases in building costs which have taken place since the ceilings were fixed in 1956 and to ensure that the same degree of assistance is given as when the grants were first introduced in 1953 (about 25 percent). (United States Embassy in London dispatch July 17, 1959.)

Uruguay

FISH MEAL PLANT DONATED BY UNITED NATIONS:

Uruguay's Servicio Oceanografico y de Pesca (Oceanographic and Fishery Service), a Government agency which has control of the fishing industry monopoly, received a donation of a fish meal plant from the United Nations. The fish meal plant will be installed at a cost of about US$46,000 and the technical know-how will be supplied by the Uruguayans.

Fish waste will be converted into fish meal to be added to feed for chickens and hogs. (Industrias Pesqueras, July 1, 1959, Vigo, Spain.)

Yugoslavia

JAPANESE TUNA VESSEL LANDS TRIP:

The Japanese tuna long-liner Banshu Maru landed 1,250 metric tons of tuna at the Yugoslav port of Rijeka on October 9, 1959.

Following the discharge of the trip, the vessel was due to take out a group of Yugoslav fishermen on trips along the Adriatic coast for the purpose of demonstrating Japanese methods of tuna fishing.

The demonstration trips were made under an agreement with Japanese shipbuilders, who have contracted to build several tuna fishing vessels for Yugoslavia.

BUOYS MARK TRANSATLANTIC TELEPHONE CABLES

A bright, yellow, and red buoy may be seen bobbing in the Atlantic Ocean off the coast of North America and Europe this year and next. It marks an important "obstruction" to ships and fishermen. For in the vicinity of one of those buoys and stretching all the way to the mainland will be a newly-laid telephone cable which may weigh as much as 25 tons per nautical mile. The American Telephone and Telegraph Company, with other companies and governmental agencies, is now engaged in the construction of telephone cable systems between United States and Europe and Puerto Rico.

In addition to the brightly painted areas on its top, the buoy has several other features which help ship captains to spot it. A brightly-colored flag is mounted about eight feet above the buoy that helps to locate it in the daytime, navigational lights make it visible at night, and a reflector provides a means of detection by ships equipped with radar.

Trawlers operating near those buoys might snag buoy moorings, or hook the cable. Buoys used to anchor submarine cable are constructed of high grade boiler steel. They weigh 1½ tons and can support six tons of moorings.

FEDERAL ACTIONS

Interstate Commerce Commission

BRINED FISH UNDER REFRIGERATION MAY BE SHIPPED BY EXEMPT CARRIER:

The Interstate Commerce Commission, in a recent decision involving a motor carrier application, ruled that lightly-salted or brined fish shipped under refrigeration may be transported by exempt carriers. The Commission held that "processed fish"--scaled, washed, slightly salted (brined), cut into portions, packaged, and shipped under refrigeration--is not a manufactured product as defined in the Transportation Act of 1958. The Act provides that ". . .fish (including shellfish). . .shall be deemed to include cooked or uncooked (including breaded) fish or shellfish when frozen or fresh (but not including fish and shellfish which have been treated for preserving, such as canned, smoked, pickled, spiced, corned or kippered products)."

Under the ruling apparently the need for further preservation such as refrigeration was the criteria used in determining that "lightly salted" or brined fish is an exempt product.

* * * * *

NEW RAILWAY EXPRESS AGENCY CONTRACTS APPROVED:

The Interstate Commerce Commission has approved the new agreement between the railroads owning the Railway Express Agency. The contract now permits the Agency to use other carriers without the railroads' approval. The Commission found that the Agency serves a useful purpose for the transportation of small shipments, and its continued existence is preferred to the entrance of other new parties into the small shipment field.

On September 4, 1959, the Agency also entered into a new contract with the airlines for the future performance of air express service. Under the new agreement the parties will have equal voice in performing air express service, and it covers new provisions for the sharing of revenues. It is expected that gross air express revenues for the next five years will be approximately one-quarter of a billion dollars. Air express traffic for the first seven months of 1959 increased 21½ percent to reach the highest level of activity in its history. This new contract requires the approval of the Civil Aeronautics Board.

Department of the Treasury

BUREAU OF CUSTOMS

DECISION RENDERED ON "IMMEDIATE CONTAINER" FOR FROZEN FISH BLOCKS:

Since no appeal was made by September 14 by the Department of Justice in the Lee Herrmann Company A/c The Coldwater Seafood Corporation vs. United States, the New York Customs Court's decision that fish blocks made from groundfish are dutiable under Tariff Paragraph 720(b), rather than Paragraph 717(b), under which groundfish fillets are dutiable, became effective September 15.

Since under Tariff Paragraph 720(b), groundfish may be dutiable at either 12½ percent ad valorem or one cent per pound, depending on whether or not the blocks are packed in bulk or in containers weighing, with contents, less than, or more than 15 pounds each, it became necessary to define "containers" or "immediate containers."

The U. S. Bureau of Customs, Washington, D. C., has ruled that for the purposes of Tariff Paragraph 720(b), the "immediate container" is the outer cardboard carton holding the 4 or 5 frozen fish blocks. The letter of September 24 addressed to the Boston Collector of Customs by the Washington office of the Bureau follows:

". . .You state that the following four types of packaging are used with respect to fish blocks imported in your district:

"(a) Four or five frozen fish blocks, each weighing from 12 to 14 pounds, are packed in one cardboard carton. Each frozen fish block is wrapped in paraffin or wax paper, without sealing, to prevent the blocks from blending together, as well as to lessen dehydration during storage and shipping to the United States. The average weight of a carton containing four frozen fish blocks is 54 pounds; the average weight of a carton containing five frozen fish blocks is $67\frac{1}{2}$ pounds.

"(b) Four or five frozen fish blocks, each weighing from 12 to 14 pounds, are packed in one cardboard carton. Each frozen fish block is inserted in a pliofilm or polyethylene film bag, to prevent the blocks from blending together, as well as to lessen dehydration during storage and shipping to the United States. The weights of the packed cartons are substantially the same as under (a) above.

"(c) Four or five frozen fish blocks, each weighing from 12 to 14 pounds, are packed in one cardboard carton. Each frozen fish block is placed in a lightweight cardboard tray without top (the bottom of one tray acting as a separator between blocks), to prevent blocks from blending or sticking together, as well as to lessen dehydration during storage and shipping to the United States. The weights of the packed cartons are substantially the same as under (a) above.

"(d) Four or five frozen fish blocks, each weighing from 12 to 14 pounds, are packed in one cardboard carton. Each frozen fish block is placed in a lightweight cardboard tray or carton (with top) which completely covers the frozen fish block, to prevent the blocks from blending or sticking together, as well as to lessen dehydration during storage and shipping to the United States. The weights of the packed cartons are substantially the same as under (a) above. In packaging of this type the inner cardboard trays or cartons are not riveted, stapled or sealed.

"Representatives of the importers have appeared in the Bureau and state that the pariffin or wax paper (in (a) above), the pliofilm or polyethylene film bags (in (b) above), and the lightweight cardboard trays or cartons (in (c) and (d) above) bear no marking or legend of any kind and are ripped or torn from the frozen fish blocks and thrown away as the first step in a long process of converting the fish blocks into fish sticks, fish flakes, or fish cakes. The fish blocks in their form as imported go no farther than the processor and never reach the retail consumer.

"The Court of Customs and Patent Appeals has stated that it is not practical to lay down a hard and fast rule by which it may be determined what is or is not an "immediate container" for the purposes of Paragraph 720 of the tariff act. In T. D. 44639 (59 Treas. Dec. 410) the court laid stress on whether the wrapper was unsealed, whether the fish in the wrapper could be carried away by a retail purchaser without first being enclosed in some other wrapper, and whether the use of the wrapper was primarily for sanitary purposes.

"In the most recent judicial decision on this subject, published as C. D. 1957 (40 Cust. Ct. 48), the court laid stress on the fact that the fish were loosely wrapped and the wrappings had no markings whatsoever to indicate the nature of the fish within the wrapper.

"The Bureau is of the opinion that in the four types of packaging outlined under (a), (b), (c), and (d) the immediate container for the purpose of Paragraph 720(b) is the outer cardboard carton holding the four or five frozen fish blocks.

"To insure that the merchandise will be so classified at each port which it may be entered, this decision is being circulated to all customs officers.

"Very truly yours,

"(s) W. E. Higman, Chief
Division of Classification
and Drawbacks"

"Honorable Maynard Hutchinson
Collector of Customs
Boston 9, Mass."

Eighty-Sixth Congress

(First Session)

Public bills and resolutions which may directly or indirectly affect the fisheries and allied industries are reported upon. Introduction, referral to committees, pertinent legislative actions, hearings, and other chamber actions by the House and Senate, as well as signature into law or other final disposition are covered.

Additional actions taken not previously reported here:

OCEANOGRAPHY: Oceanography in the United States: Hearings before the Special Subcommittee on Merchant Marine and Fisheries, 86th Congress, 1st Session, Washington, D. C.--March 3, 10, 12, 17, April 21, 23, June 23, July 13 and 14, 1959; Carderock, Md.--April 24, 1959; Boston, Mass.--June 1, 1959; Woods Hole, Mass., June 2, 1959); 399 pp., printed. Purpose was to determine to what extent the United States should go to carry out a broad and effective national program of oceanographic studies. The goal of the Subcommittee on Oceanography is to conduct a comprehensive study in the field of oceanography so that it can make positive and factual representations and recommendations to the Congress for guidance in carrying out a firm oceanographic program. Contains statements, reports, and recommendations of scientists and representatives of Government and industry. The Subcommittee heard reports on the work of the Fish and Wildlife Service in oceanography in relation to fishery investigations. It was pointed out in testimony that oceanographic fishery investigations were essential as the means of furthering knowledge of the vast food resources of the sea. The Subcommittee also queried witnesses on the effects of atomic waste disposal on offshore fisheries.

BOILED CORN AS FISH BAIT

The fishermen of Lake St. Basil, Macedonia, Greece, have used boiled corn as bait with remarkable results. The cost of the bait is insignificant.

--Aleia,
September 1955.

Editorial Assistant--Ruth V. Keefe Illustrator--Gustaf T. Sundstrom

Compositors--Jean Zalevsky, Alma Greene, Helen Joswick, and Vera Eggleston

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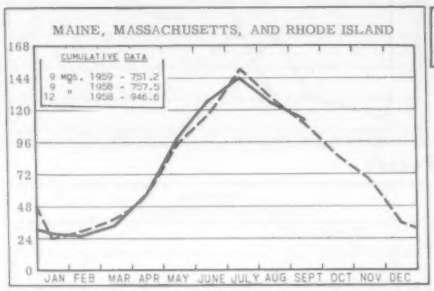
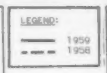
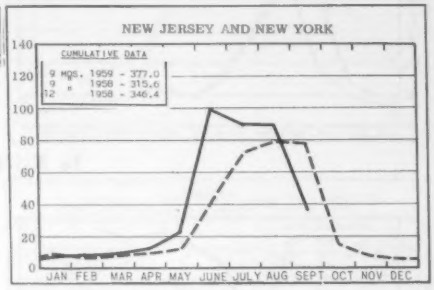
Photograph Credit: P. 1--Publifoto, Rome, Italy. Photographs on pages not mentioned were obtained from the Service's file and the photographers are unknown.

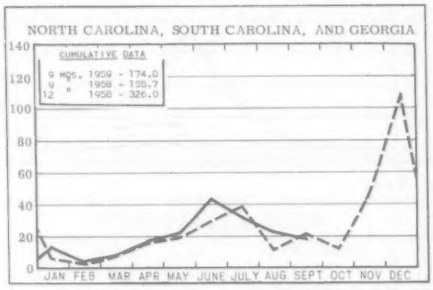
CHART 1 - FISHERY LANDINGS for SELECTED STATES

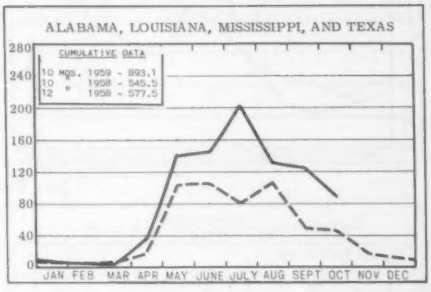
In Millions of Pounds

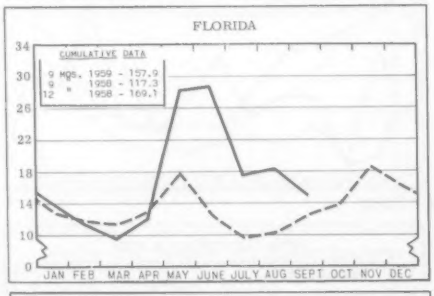


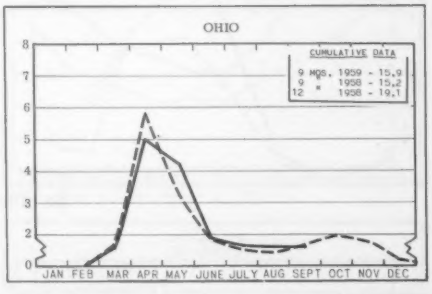


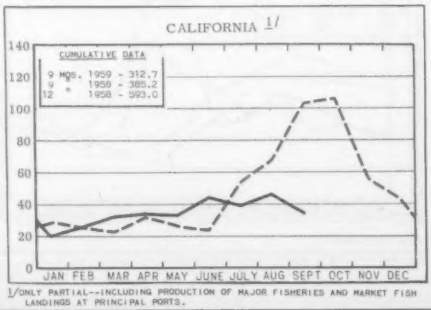












1/ONLY PARTIAL--INCLUDING PRODUCTION OF MAJOR FISHERIES AND MARKET FISH LANDINGS AT PRINCIPAL PORTS.

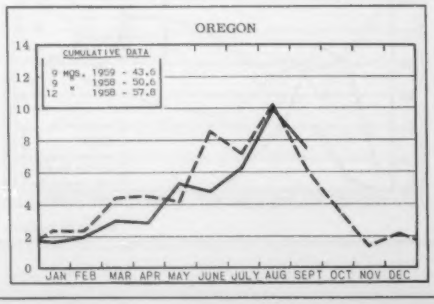
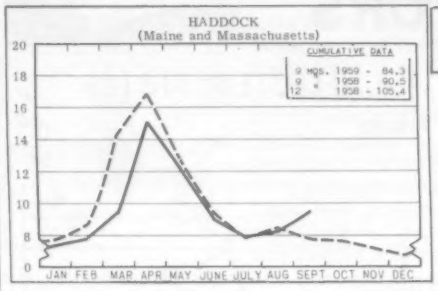
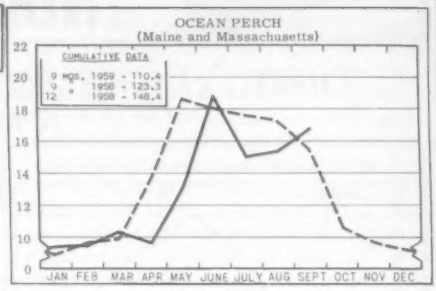


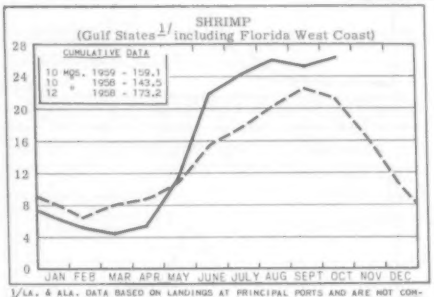
CHART 2 - LANDINGS for SELECTED FISHERIES

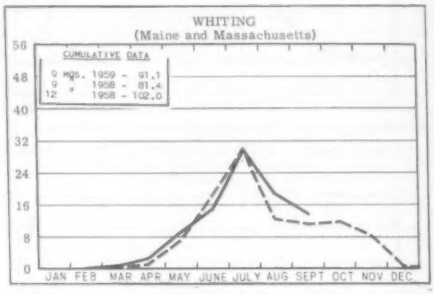
In Millions of Pounds


HADDOCK
(Maine and Massachusetts)
CUMULATIVE DATA
9 MOS. 1959 - 84.3
9 " 1958 - 90.5
12 " 1958 - 105.4
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC


OCEAN PERCH
(Maine and Massachusetts)
CUMULATIVE DATA
9 MOS. 1959 - 110.4
9 " 1958 - 123.3
12 " 1958 - 148.4
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

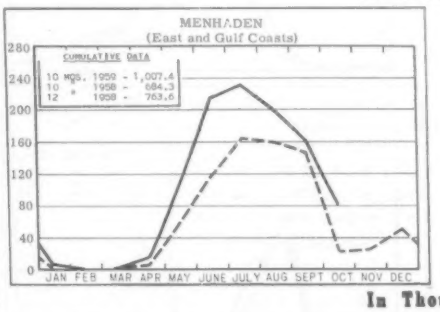
In Millions of Pounds

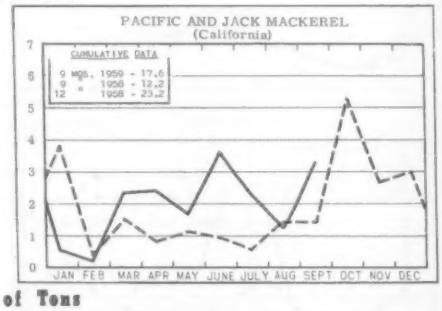

SHRIMP
(Gulf States 1/ including Florida West Coast)
CUMULATIVE DATA
10 MOS. 1959 - 159.1
10 " 1958 - 143.5
12 " 1958 - 173.2
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC


WHITING
(Maine and Massachusetts)
CUMULATIVE DATA
9 MOS. 1959 - 91.1
9 " 1958 - 81.4
12 " 1958 - 102.0
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

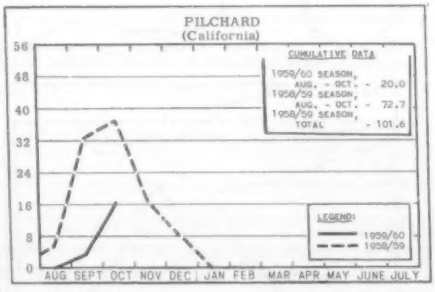
1/ La. & Ala. data based on landings at principal ports and are not complete.

In Thousands of Tons


MENHADEN
(East and Gulf Coasts)
CUMULATIVE DATA
10 MOS. 1959 - 1,007.4
10 " 1958 - 684.3
12 " 1958 - 763.6
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC


PACIFIC AND JACK MACKEREL
(California)
CUMULATIVE DATA
9 MOS. 1959 - 17.6
9 " 1958 - 12.2
12 " 1958 - 23.2
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

In Thousands of Tons



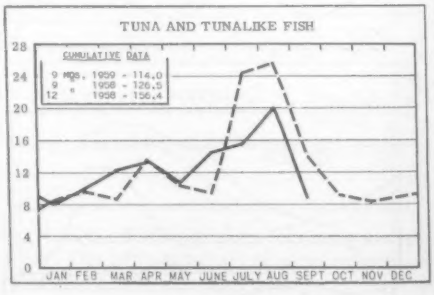
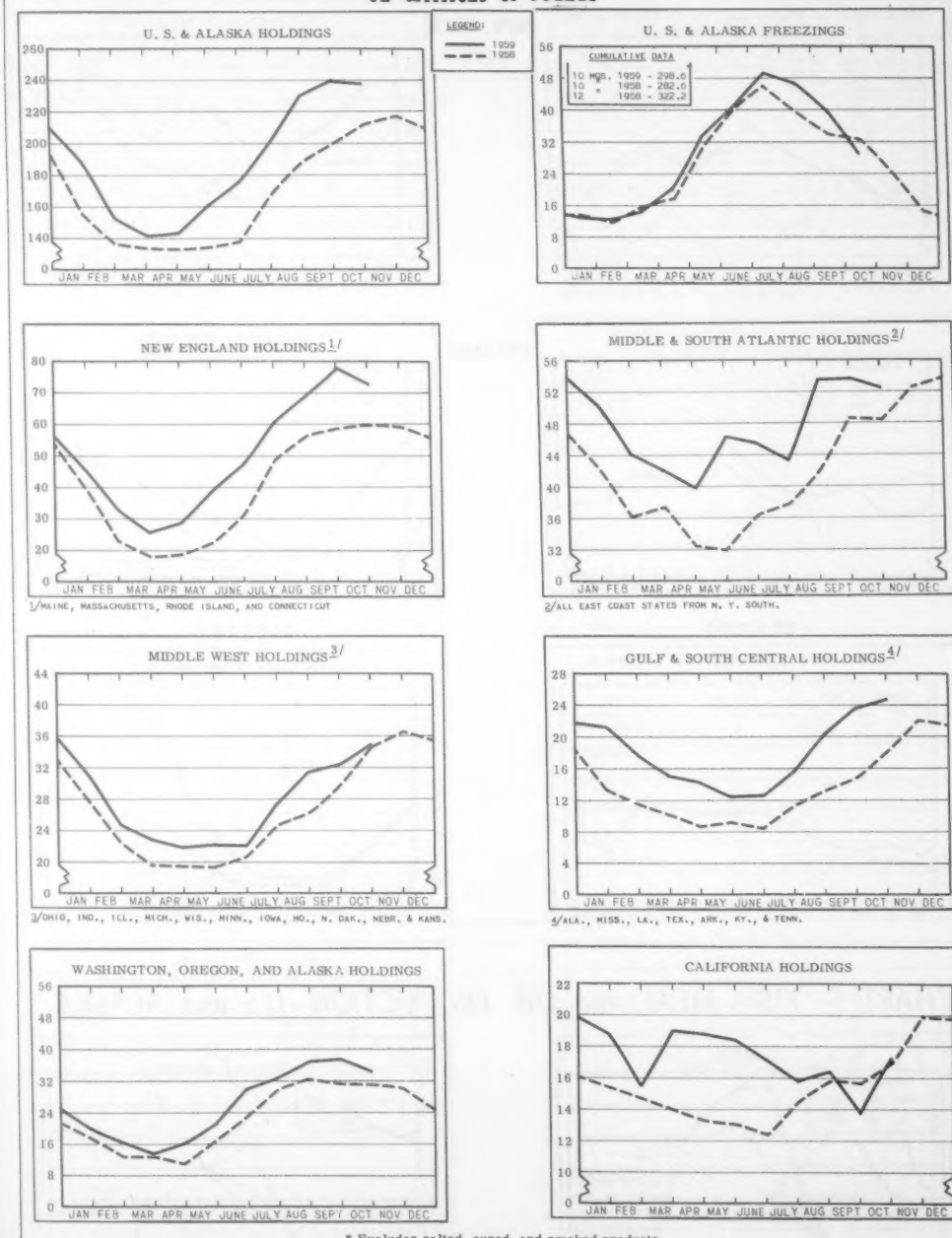

TUNA AND TUNALIKE FISH
CUMULATIVE DATA
9 MOS. 1959 - 114.0
9 " 1958 - 126.5
12 " 1958 - 156.4
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

In Millions of Pounds


U. S. & ALASKA HOLDINGS
LEGEND:
1959
1958
U. S. & ALASKA FREEZINGS
CUMULATIVE DATA
10 MOS. 1959 - 298.6
10 " 1958 - 282.6
12 " 1958 - 322.2
NEW ENGLAND HOLDINGS 1/
MIDDLE & SOUTH ATLANTIC HOLDINGS 2/
MIDDLE WEST HOLDINGS 3/
GULF & SOUTH CENTRAL HOLDINGS 4/
WASHINGTON, OREGON, AND ALASKA HOLDINGS
CALIFORNIA HOLDINGS
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

1/MAINE, MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT

2/ALL EAST COAST STATES FROM N. Y. SOUTH.

3/OHIO, IND., ILL., MICH., WIS., MINN., IOWA, MO., N. DAK., NEBR. & KANS.

4/ALA., MISS., LA., TEX., ARK., KY., & TENN.

* Excludes salted, cured, and smoked products.

CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pounds

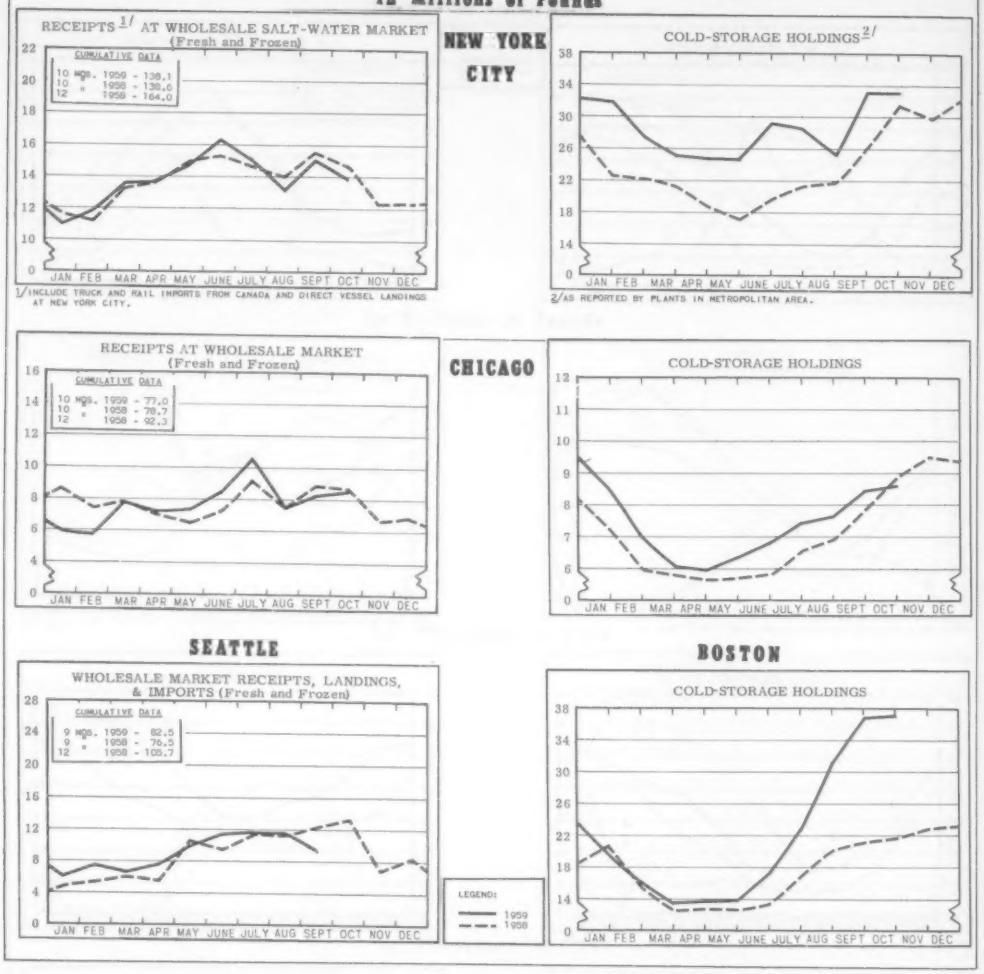

RECEIPTS 1/ AT WHOLESALE SALT-WATER MARKET (Fresh and Frozen)
CUMULATIVE DATA
10 MOS. 1959 - 138.1
10 " 1958 - 138.6
12 " 1958 - 164.0
NEW YORK CITY
COLD-STORAGE HOLDINGS 2/
1/INCLUDE TRUCK AND RAIL IMPORTS FROM CANADA AND DIRECT VESSEL LANDINGS AT NEW YORK CITY.
2/AS REPORTED BY PLANTS IN METROPOLITAN AREA.
RECEIPTS AT WHOLESALE MARKET (Fresh and Frozen)
CUMULATIVE DATA
10 MOS. 1959 - 77.0
10 " 1958 - 78.7
12 " 1958 - 92.3
CHICAGO
COLD-STORAGE HOLDINGS
SEATTLE
WHOLESALE MARKET RECEIPTS, LANDINGS, & IMPORTS (Fresh and Frozen)
CUMULATIVE DATA
9 MOS. 1959 - 82.5
9 " 1958 - 76.5
12 " 1958 - 105.7
BOSTON
COLD-STORAGE HOLDINGS
LEGEND:
1959
1958
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

CHART 5 - FISH MEAL and OIL PRODUCTION - U.S and ALASKA

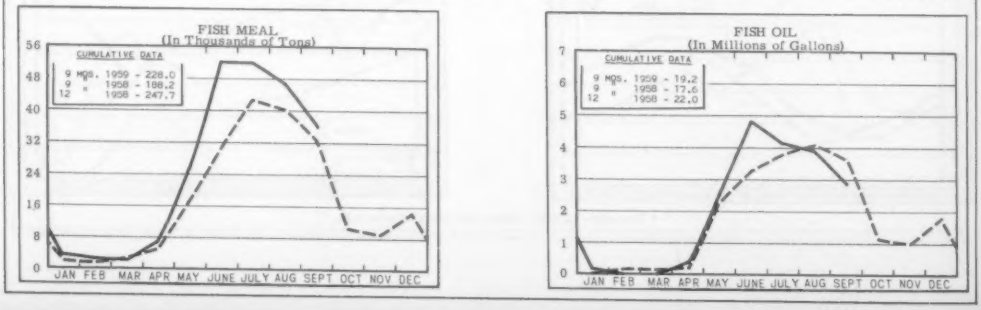
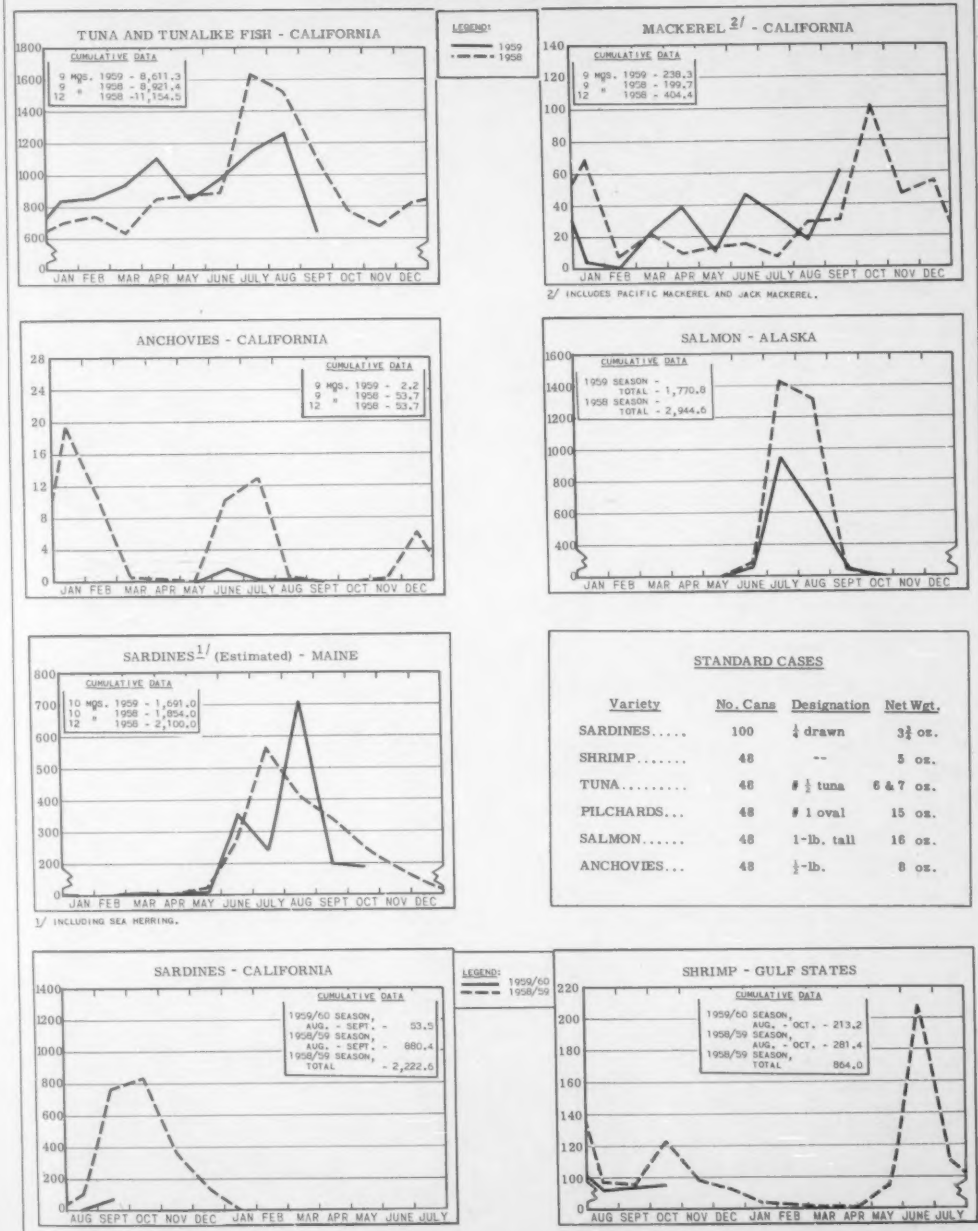

FISH MEAL (In Thousands of Tons)
CUMULATIVE DATA
9 MOS. 1959 - 228.0
9 " 1958 - 188.2
12 " 1958 - 247.7
FISH OIL (In Millions of Gallons)
CUMULATIVE DATA
9 MOS. 1959 - 19.2
9 " 1958 - 17.6
12 " 1958 - 22.0
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

In Thousands of Standard Cases

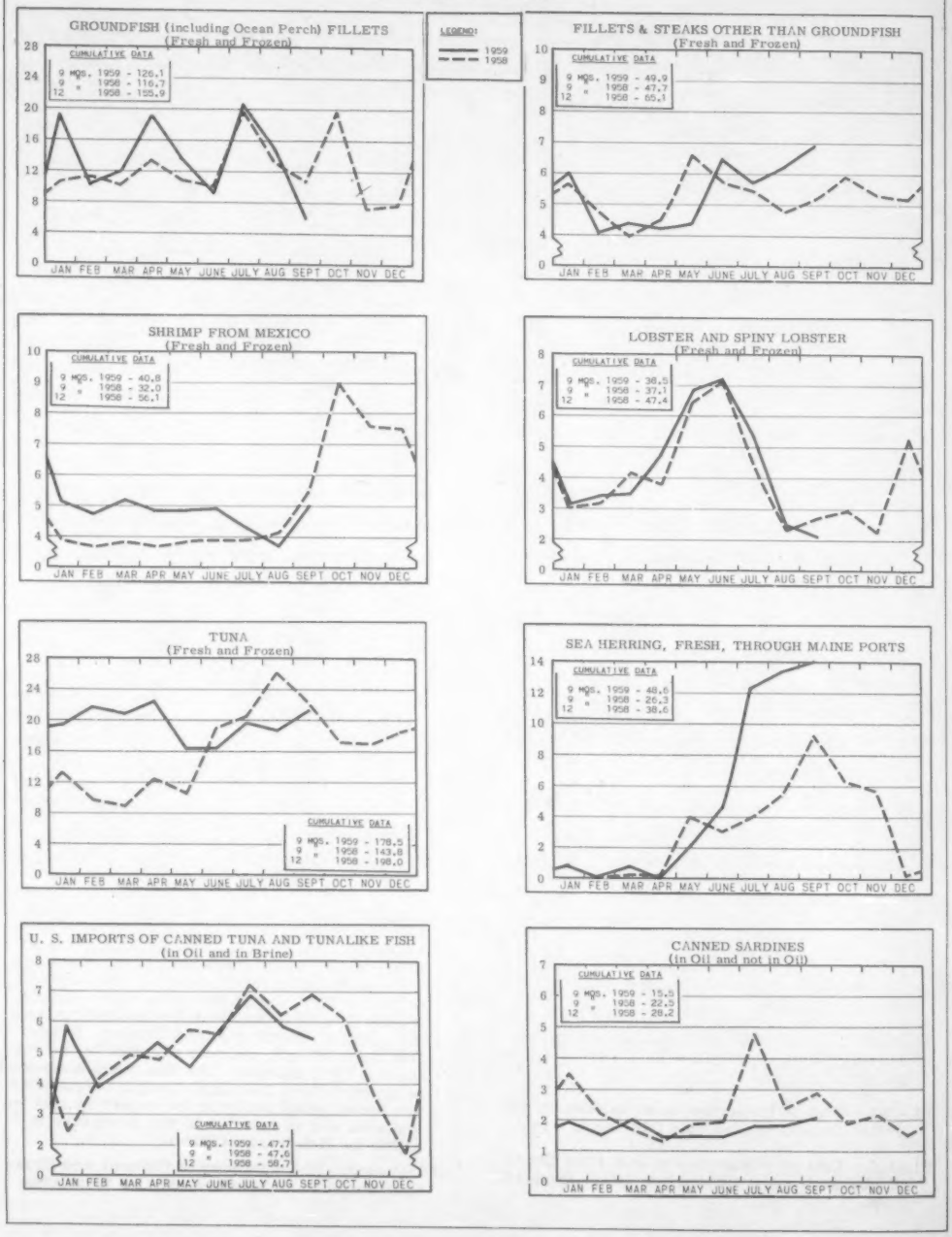

TUNA AND TUNALIKE FISH - CALIFORNIA
CUMULATIVE DATA
9 MOS. 1959 - 8,611.3
9 " 1958 - 8,921.4
12 " 1958 -11,154.5
LEGEND:
1959
1958
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
MACKEREL 2/ - CALIFORNIA
CUMULATIVE DATA
9 MOS. 1959 - 238.3
9 " 1958 - 199.7
12 " 1958 - 404.4
2/ INCLUDES PACIFIC MACKEREL AND JACK MACKEREL.
ANCHOVIES - CALIFORNIA
CUMULATIVE DATA
9 MOS. 1959 - 2.2
9 " 1958 - 53.7
12 " 1958 - 53.7
SALMON - ALASKA
CUMULATIVE DATA
1959 SEASON - TOTAL - 1,770.8
1958 SEASON - TOTAL - 2,944.6
SARDINES 1/ (Estimated) - MAINE
CUMULATIVE DATA
10 MOS. 1959 - 1,691.0
10 " 1958 - 1,854.0
12 " 1958 - 2,100.0
1/ INCLUDING SEA HERRING.
SARDINES - CALIFORNIA
CUMULATIVE DATA
1959/60 SEASON, AUG. - SEPT. - 53.5
1958/59 SEASON, AUG. - SEPT. - 880.4
1958/59 SEASON, TOTAL - 2,222.6
AUG SEPT OCT NOV DEC JAN FEB MAR APR MAY JUNE JULY
LEGEND:
1959/60
1958/59
SHRIMP - GULF STATES
CUMULATIVE DATA
1959/60 SEASON, AUG. - OCT. - 213.2
1958/59 SEASON, AUG. - OCT. - 281.4
1958/59 SEASON, TOTAL 864.0

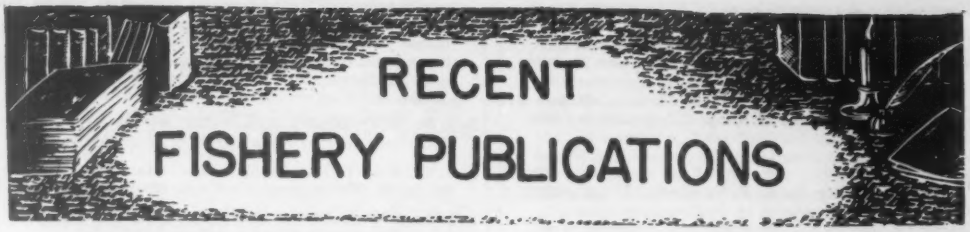
STANDARD CASES

Variety	No. Cans	Designation	Net Wgt.
SARDINES.....	100	¼ drawn	3¾ oz.
SHRIMP.....	48	--	5 oz.
TUNA.....	48	# ½ tuna	6 & 7 oz.
PILCHARDS...	48	# 1 oval	15 oz.
SALMON.....	48	1-lb. tall	16 oz.
ANCHOVIES...	48	½-lb.	8 oz.

CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds


GROUNDFISH (including Ocean Perch) FILLETS
(Fresh and Frozen)
CUMULATIVE DATA
9 MOS. 1959 - 126.1
9 " 1958 - 116.7
12 " 1958 - 155.9
LEGEND:
1959
1958
FILLETS & STEAKS OTHER THAN GROUNDFISH
(Fresh and Frozen)
CUMULATIVE DATA
9 MOS. 1959 - 49.9
9 " 1958 - 47.7
12 " 1958 - 65.1
SHRIMP FROM MEXICO
(Fresh and Frozen)
CUMULATIVE DATA
9 MOS. 1959 - 40.8
9 " 1958 - 32.0
12 " 1958 - 56.1
LOBSTER AND SPINY LOBSTER
(Fresh and Frozen)
CUMULATIVE DATA
9 MOS. 1959 - 36.5
9 " 1958 - 37.1
12 " 1958 - 47.4
TUNA
(Fresh and Frozen)
CUMULATIVE DATA
9 MOS. 1959 - 178.5
9 " 1958 - 143.8
12 " 1958 - 198.0
SEA HERRING, FRESH, THROUGH MAINE PORTS
CUMULATIVE DATA
9 MOS. 1959 - 48.6
9 " 1958 - 26.3
12 " 1958 - 38.6
U. S. IMPORTS OF CANNED TUNA AND TUNALIKE FISH
(in Oil and in Brine)
CUMULATIVE DATA
9 MOS. 1959 - 47.7
9 " 1958 - 47.6
12 " 1958 - 58.7
CANNED SARDINES
(in Oil and not in Oil)
CUMULATIVE DATA
9 MOS. 1959 - 15.8
9 " 1958 - 22.5
12 " 1958 - 28.2
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC



FISH AND WILDLIFE SERVICE PUBLICATIONS

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FL - FISHERY LEAFLETS.
SL - BRANCH OF STATISTICS LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
SSR.- FISH. SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number Title

CFS-2043 - Louisiana Landings, January 1959, 2 pp.
CFS-2086 - Louisiana Landings, February 1959, 2 pp.
CFS-2090 - Imports & Exports of Fishery Products, 1954-1958 Annual Summaries, 10 pp.
CFS-2100 - Ohio Landings, June 1959, 2 pp.
CFS-2111 - New York Landings, June 1959, 4 pp.
CFS-2114 - North Carolina Landings, July 1959, 3 pp.
CFS-2115 - Fish Meal and Oil, July 1959, 2 pp.
CFS-2116 - California Landings, April 1959, 4 pp.
CFS-2118 - Louisiana Landings, March 1959, 2 pp.
CFS-2121 - Massachusetts Landings, June 1959, 5 pp.
CFS-2123 - Georgia Landings, July 1959, 2 pp.
CFS-2124 - South Carolina Landings, July 1959, 2 pp.
CFS-2125 - Florida Landings, July 1959, 7 pp.
CFS-2126 - Maine Landings, July 1959, 3 pp.
CFS-2127 - New York Landings, July 1959, 4 pp.
CFS-2128 - Frozen Fish Report, August 1959, 8 pp.
CFS-2133 - Middle Atlantic Fisheries, 1958 Annual Summary, 5 pp.
CFS-2134 - Mississippi Landings, May 1959, 2 pp.
CFS-2136 - Alabama Landings, May 1959, 2 pp.
CFS-2138 - Mississippi Landings, June 1959, 2 pp.
CFS-2140 - Shrimp Landings, May 1959, 6 pp.
CFS-2143 - Alabama Landings, June 1959, 2 pp.
CFS-2165 - Gulf Fisheries, 1958 Annual Summary, 12 pp.

FL-254 - List of Fishery Associations in the United States, September 1959 (Revised), 13 pp.

FL-292 - List of Fisheries Associations in the United States, August 1959 (Revised), 5 pp.

FL-293 - List of Fishermen's and Fish Shore Workers' Unions, September 1959 (Revised), 8 pp.

FL-354 - Reef Fishing in the Philippines, by A. F. Umali and H. E. Warfel, 28 pp., illus., 1949.

Canned Fish Consumer Purchases, 1959:
FL-478i - July, 31 pp.
FL-478j - August, 31 pp.

Wholesale Dealers in Fishery Products (Revised):
SL- 12 - Virginia, 1959.
SL- 44 - Nebraska (Missouri River and Tributaries), 1959.

SL-113 - Firms Canning Crab Meat, 1958.

SSR-Fish No. 285 - Estimating Maximum Fishing Depth of Longline Gear with Chemical Sounding Tubes, by Joseph J. Graham and Dorothy D. Stewart, 19 pp., illus., December 1958. A summary of methods used by various investigators to estimate the fishing depth of longline is given. Sounding tubes, used by Pacific Oceanic Fishery Investigations biologists in conjunction with studies of albacore tuna, Germo alalunga (Bonnaterre), in the central North Pacific, measure the depth of the long line with considerable accuracy. A method, using readings provided by the tubes, is developed so that the observed "hang" of a given basket of gear and the theoretical "hang" can be compared. It is suggested that distortions related to retrieving procedures can be overcome. A technique is shown by which the maximum fishing depths for individual hooks along an entire set of gear can be estimated.

SSR-Fish No. 302 - Experimental Fishing to Determine Distribution of Salmon in North Pacific Ocean and Bering Sea, 1956, by Mitchell G. Hanavan and George K. Tanonaka, 26 pp., illus., May 1959. Five vessels were employed from May to October 1956 to study the distribution of Pacific salmon in the North Pacific Ocean and Bering Sea. The operation was designed to provide samples of fish for racial identification to provide evidence of seasonal movements and changes in the distribution of salmon; and to study the ocean habitat and conditions that control the distribution, movement, and survival of salmon. The area of operation was approximately 2 million square miles extending from the coast of Washington and Oregon. Within this area 195 gill-net sets resulted in the capture of 7,963 salmon. The fish were measured on board before freezing. Length frequencies are shown graphically in the report by species and area and in relation to the mesh size in which the fish were captured.

SSR-Fish No. 304 - Biology of Chinook and Blueback Salmon and Steelhead in the Wenatchee

River System, by Robert R. French and Roy J. Wahle, 21 pp., illus., June 1959.

SSR-Fish No. 307 - Fishery Management Studies on the Madison River System in Yellowstone National Park, by Norman G. Bensen, Oliver B. Cope, and Ross V. Bulkley, 33 pp., illus., May 1959.

SSR-Fish No. 309 - Ecology of the Sheepscot River Estuary, by Alden P. Stickney, 25 pp., illus., May 1959.

Operations of the Bureau of Commercial Fisheries under the Saltonstall-Kennedy Act, Fiscal Year 1958, 75 pp., illus., processed. The fourth annual report to the Congress of the activities of the U. S. Bureau of Commercial Fisheries during the fiscal year 1958 under the provisions of the Saltonstall-Kennedy Act of July 1, 1954. The Act makes available funds from import duties on foreign fishery products for the promotion of the free flow in commerce of domestic fishery products and provides funds for a range of research and services in support of the conservation and development of the fishery resources and the stabilization of the fishery industry. Among the important biological research programs of work during fiscal year 1958: (1) in New England, research on the sea scallop revealed means of increasing the overall yield from the sea scallop fishery by regulating the size of the metal rings in the dredges; (2) on the Pacific Coast, new and expanded high-seas oceanographic studies added to knowledge on sardine populations, especially the relationship between water temperature and spawning; and (3) studies in Alaska gave valuable information on improving the effectiveness of present salmon harvesting regulations and made considerable progress in accurately predicting the sizes of future salmon runs. In the industrial field, new or expanded emphasis in research was placed on: (1) improving the quality of fishery products, the development and promulgation of grade standards, and conducting voluntary inspection in fish processing plants; (2) finding new uses for fish oils; (3) determining the nutritive values of fish meals in animal feeds; (4) improving the processing and marketability of fishery products; and (5) broad economic research dealing with the soaring costs of marine insurance, fishery transportation costs, domestic production costs of U. S. groundfish and albacore, production costs of these same species in major competing countries, consumer reaction to present marketing techniques, and studies of fresh fish consumption and the industrial feeding market. New or expanded service functions included: (1) the collection of detailed biological and economic statistical data on shrimp in the South Atlantic and Gulf areas to provide better data to the industry on a current basis; (2) expanded reporting services on prices and market conditions for frozen fishery products at key marketing centers, current reporting on imports of fishery products and byproducts at main ports of entry, and coverage of prices and market conditions for canned fishery products; (3) the collection and distribution of market information on fishery receipts and wholesale prices at Baltimore, Md.; (4) new and expanded explorations for fishery species including shrimp, king crab, clams, industrial fish, snapper, and tuna; and (5) expanded fishery education and market development functions including kitchen-testing, fish-cookery demonstrations, market promotion, and visual education.

Sep. No. 565 - Shrimp Exploration by the M/V Oregon along the Northeast Coast of South America.

Sep. No. 566 - Influence of Vessel-Handling Practices on Formation of Black Spot in Shrimp.

Sep. No. 567 - Fish and Shellfish Purchases by Public Schools with Food Services, 1957-58.

Sep. No. 568 - Research in Service Laboratories (November 1959): Contains these articles--"Chemical Composition of Pacific Coast Fish and Shellfish;" "Freezing and Cold Storage of Pacific Oysters and Fresh-Water Fish;" "New Products from Fish Oils--Monoglycerides;" "Study of Chemical Compounds Formed During Spoilage of Fish;" and "Thread Herring Meal Nutritional Studies."

Sep. No. 569 - Use of Plastic Sheets for Conversion of Soft, Muddy Bottoms into Oyster Beds.

THE FOLLOWING ENGLISH TRANSLATIONS OF FOREIGN LANGUAGE ARTICLES ARE NOT FOR GENERAL DISTRIBUTION BUT ARE AVAILABLE FOR REFERENCE ONLY FROM THE U. S. FISH AND WILDLIFE SERVICE, BUREAU OF COMMERCIAL FISHERIES, P. O. BOX 3830, HONOLULU, HAWAII.

Comparison of Variations of Fishing Condition in a Whole Year Among Each Subarea and Migration of Fish Groups in the Southern Part of the Pacific Ocean, by Jun Nakagomo, 5 pp., processed, translation. (Bulletin of the Japanese Society of Scientific Fisheries, vol. 24, no. 12, 1959, pp. 957-960.)

Correlation between the Movement and Appearance of Fish School, by Toshiro Euroki, 15 pp., processed, translated from Japanese. (Reprinted from Memoirs of the Faculty of Fisheries, Kagoshima University, vol. 7, February 1959, pp. 87-101.)

Migration and Behavior of Large Scad in the Black Sea, by V. N. Tikhonov, 16 pp., processed, translated from Russian. (Reprinted from Behavior of Fish and Commercial Exploration, V. N. I. R. O., Trudy, vol. 36, pp. 52-61.)

Observations on the Reaction of Black Sea Anchovies and Some Other Fishes to Artificial Irritants, by N. N. Danelevsky and D. V. Radakov, 8 pp., processed, translated from Russian. (Reprinted from Behavior of Fish and Commercial Exploration, V. N. I. R. O., Trudy, vol. 36, pp. 25-32.)

THE FOLLOWING ENGLISH TRANSLATIONS OF FOREIGN LANGUAGE ARTICLES ARE AVAILABLE FOR LIMITED DISTRIBUTION FROM THE U. S. FISH AND WILDLIFE SERVICE, BUREAU OF COMMERCIAL FISHERIES, P. O. BOX 3830, HONOLULU, HAWAII.

Catch Variations in the North Pacific Albacore. I--Recruitment and Dispersion of the North Pacific Albacore, by Akira Suda, 24 pp., illus., processed. (Translation of Report of Nankai Regional Fisheries Research Laboratory, no. 9, December 1958, pp. 103-116.)

Catch Variations in the North Pacific Albacore. II--Variation in the Amount of Recruitment, by Akiro Suda, 22 pp., illus., processed. (Trans-

lation of Report of the Nankai Regional Fisheries Research Laboratory, no. 10, March 1959, pp. 72-87.)

Fishing Condition of the Indian Ocean, by Koya Mimura, 3 pp., processed, translation. (Tuna Fishing, no. 53, October 1958, pp. 25-26, The Investigative Society of Tuna Fishery, Kangawa Prefecture, Japan.)

On the Migration and the Growth of the Skipjack, KATSUWONUS PELAMIS (Linnaeus), in the Izu and Bonin Sea Areas and the North-Eastern Sea Area Along the Pacific Coast of Japan, by Tsuyoshi Kawasaki, 34 pp., illus., processed, translation. (Bulletin of Tohoku Regional Fisheries Research Laboratory, no. 4, March 1955, pp. 101-119.)

On the Migration and the Growth of the Skipjack, KATSUWONUS PELAMIS (Linnaeus), in the South-Western Sea Area of Japan, by Tsuyoshi Kawasaki, 34 pp., illus., processed, translation. (Report of Tohoku Regional Fisheries Research Laboratory, no. 4, pp. 83-100.)

On the Nitrogen Cycle and Cultivable Capacity of Fish in the Balanced Aquarium, by Aritsune Saeki, 15 pp., illus., English translation, processed. (Translated from the Japanese Journal of Limnology, vol. 19, nos. 3 & 4, March 1958, pp. 118-129.)

THE FOLLOWING SERVICE PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

(Baltimore) Monthly Summary--Fishery Products, June, July, August 1959; 6, 6, and 7 pp., respectively. (Market News Service, U. S. Fish and Wildlife Service, 400 E. Lombard St., Baltimore 2, Md.) Includes arrivals of fresh and frozen fishery products receipts by original receivers on the Baltimore Wholesale Fish Market, for the months indicated.

California Fishery Products Monthly Summary, July 1959; 13 pp. (Market News Service, U. S. Fish and Wildlife Service, Post Office Bldg., San Pedro, Calif.) California cannery receipts of tuna and tunalike fish, mackerel, and anchovies; pack of canned tuna, mackerel, and anchovies; market fish receipts at San Pedro, Santa Monica, and Eureka areas; California imports; canned fish and frozen shrimp prices; ex-vessel prices for cannery fish; American Tuna Boat Association auction sales; for the month indicated.

Gulf Monthly Landings, Production, and Shipments of Fishery Products, June, July and August 1959, 6 pp. each. (Market News Service, U. S. Fish and Wildlife Service, 609-611 Federal Bldg., New Orleans 12, La.) Gulf States shrimp, oyster, finfish, and blue crab landings; crab meat production; LCL express shipments from New Orleans; wholesale prices of fish and shellfish on the New Orleans French Market; sponge sales; and fishery imports at Port Isabel and Brownsville, Tex., for the months indicated.

New England Fisheries--Monthly Summary, August 1959, 22 pp. (Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston 10, Mass.) Reviews the principal New England fishery ports, and presents food fish landings by ports and species; industrial fish landings and ex-vessel prices; imports; cold-storage stocks of fishery products in New England warehouses; fishery landings and ex-vessel prices for ports in Massachusetts (Boston, Gloucester, New Bedford, Provincetown, and Woods Hole), Maine (Portland and Rockland), Rhode Island (Point Judith), and Connecticut (Stonington); frozen fishery products prices to primary wholesalers at Boston, Gloucester, and New Bedford; and landings and ex-vessel prices for fares landed at the Boston Fish Pier and sold through the New England Fish Exchange; for the month indicated.

New York City's Wholesale Fishery Trade--Monthly Summary for May and June 1959, 20 and 22 pp., respectively. (Market News Service, 155 John St., New York 38, N. Y.) Includes summaries and analyses of receipts and prices on wholesale Fulton Fish Market, imports entered at New York City, primary wholesaler prices for frozen products, and marketing trends; for the months indicated.

(Seattle) Washington, Oregon, and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, August 1959, 10 pp. (Market News Service, U. S. Fish and Wildlife Service, Pier 42 South, Seattle 4, Wash.) Includes landings and local receipts, with ex-vessel and wholesale prices in some instances, as reported by Seattle and Astoria (Ore.) wholesale dealers; also Northwest Pacific halibut landings; and Washington shrimp landings; for the month indicated.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C.

How to Cook Scallops, by Dorothy M. Keller, Paula W. Lemmon, and Rose G. Kerr, Test Kitchen Series No. 13, 19 pp., illus., printed, 20 cents, 1959. Contains 39 choice kitchen-tested recipes for cooking scallops and a generous number of illustrations. Inasmuch as scallops are marketed in the form of dressed meat, many people do not know that they are a shellfish--a mollusk possessing two shells, similar to oysters or clams. The scallop moves around in the water by actively snapping its shells together. This shell-snapping results in the development of an oversized muscle called the "adductor muscle." This excellently-flavored muscle is the only part of the scallop eaten by Americans. Europeans, however, eat the entire scallop. There are two varieties of scallops--the large sea scallop and the smaller bay scallop. The sea scallop is taken from the deep waters off the northern and middle Atlantic States. The bay scallop is taken from inshore bays and estuaries from New England to the Gulf of Mexico and in the Pacific Northwest. Scallops, according to the new booklet, are marketed all year but are at their best when taken from November to April. Fresh scallops are a light cream color, sometimes varying to a delicate pink. Scallops are available fresh or frozen, but only in the form of dressed meat, as the scallops are opened, packed, and iced at sea.

Fresh scallops and frozen scallops when thawed, should have a sweetish odor. When bought in packages, they should be practically free of liquid. Both the sea and the bay scallop have a lean, light, firm meat and a sweet flavor. Both contain high levels of well-balanced protein, very little fat, and many of the minerals and vitamins so necessary for good health.

Life History of the Sea Lamprey of Cayuga Lake, New York, by Roland L. Wigley, Fishery Bulletin 154 (from Fishery Bulletin of the Fish and Wildlife Service, vol. 59), pp. 561-617, illus., printed, 40 cents, 1959.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

ALEWIVES:

The Run, by John Hay, 192 pp., illus., printed, $3.95. Doubleday & Company, Inc., Garden City, N. Y., 1959. An unusual and beautifully written book about the alewife run up the streams of Cape Cod in the spring. The author describes his observations from late winter, before the onset of the adult alewife migration up the rivers and streams, until mid-July, when the offspring begin to swim down toward the open sea. The alewife fishery, once one of great economic importance in New England both for food and fertilizer (alewives planted along with the seeds were said to make the corn grow tall and plump), has now degenerated to an unimportant bait fishery. Yet the author has brought together the scientific aspects and the poetry and philosophy inherent in the great spawning migrations of the alewife. The book includes, among others, chapters on the arrival, the reproductive urge, and the nature of an alewife; and migration from salt- to freshwater. In his conclusion, the author explains: "The mystery about the travels of birds, eels, monarch butterflies, or alewives, is not only a matter of routes or seasonal behavior. It has to do with an internal response to this spinning globe and its unendingly creative energies."

BRITISH GUIANA:

Review of the Fisheries of British Guiana in 1958, Bulletin No. 1, 53 pp., illus., printed. Fisheries Division, Department of Agriculture, Georgetown, British Guiana, 1959. Summarizes the work of the British Guiana Fisheries Division in 1958 as well as current progress and developments and future objectives. Discusses, among others, the following topics: fishing grounds and operational areas, fishing methods and gear, wholesale markets, seasonal fluctuations of fish supplies, pond cultivation progress, aquarium fish trade, and imports of fishery products. The report also contains sections on trawling, snapper fishing, cooperatives, fishery loans, and research projects. Includes a number of charts and graphs as well as statistical tables on landings and prices of fishery products.

BYPRODUCTS:

"Marine Products - Parts I and II," article, The Feed Bag (Buyers' Guide of 1959), pp. 76-80, printed. Editorial Service Company, 1712 W. St. Paul Ave., Milwaukee 3, Wis. Describes a number of marine products used in the manufacture of animal feeds. Part I presents details of place of origin, chemical composition, and use of fish meals--menhaden, sardine, herring, salmon, white fish, crab, and shrimp. Part II is devoted to other marine products such as condensed fish solubles, dried fish solubles precipitate, homogenized condensed fish, fish bonemeal, and kelp meal.

CANADA:

Fisheries Statistics of Canada - Newfoundland, 1957, 28 pp., printed in French and English, 50 Canadian cents. The Queen's Printer and Controller of Stationery, Ottawa, Canada, August 1959. Presents statistical tables showing quantity and value of Newfoundland's principal species of fish and shellfish; capital equipment in the primary fishery operations; and number of persons engaged in the fisheries.

Fisheries Statistics of Canada, 1957 (Quebec), 59 pp., illus., printed in French and English, C$1. Queen's Printer and Controller of Stationery, Ottawa, Canada, September 1959. Consists of tables giving the quantity and value of the principal species of fish and shellfish landed in Quebec in 1939-57; quantity and value of landings by species and fisheries districts, 1956-57; capital equipment employed in the primary fisheries operations by fisheries districts, 1956-57; number of persons engaged in the fisheries by fisheries districts, 1956-57; and quantity and value of manufactured fishery products by species and fisheries, 1956-57.

Journal of the Fisheries Research Board of Canada, vol. 16, no. 4, August 1959, 177 pp., illus., printed. Queen's Printer and Controller of Stationery, Ottawa, Canada. Contains, among others, these articles: "Biochemical Studies on Sockeye Salmon During Spawning Migration. VI--Ribonucleic Acid and Deoxyribonucleic Acid," by Vera M. Creelman and Neil Tomlinson; "Fatigue and Mortality in Troll-Caught Pacific Salmon (Oncorhynchus)," by R. R. Parker, E. C. Black, and P. A. Larkin; "Factors Affecting the Nitrite Content of Treated Fish Fillets," by C. H. Castell and Maxine F. Greenough; "Variation in the Annual Average Weight of Chum Salmon Caught in British Columbia Waters, 1946 to 1958," by H. Godfrey; "Comparison of Certain Scottish and Canadian Experiments in Respect of Grading Fish for Quality," by J. M. Shewan and A. S. C. Ehrenberg; "Biochemical Studies on Sockeye Salmon During Spawning Migration. VIII--Androgen Content of Testes," by D. R. Idler and H. Tsuyuki; and "Studies on the Conversion of Fish Stickwater to Solubles. IV--Effect of Enzyme Treatment on the Viscosity of Whale Solubles," by J. R. McBride, R. A. MacLeod, and D. R. Idler.

Operations of Modern Longliners and Draggers, Atlantic Seaboard, 1952-1957, by John Proskie, Primary Industry Studies No. 1, vol. 7, part 1,

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

70 pp., illus., processed. Economics Service, Department of Fisheries of Canada, Ottawa, Canada, 1958. This is the first part of the seventh annual progress reports on the study of the operations of modern fishing craft on the Atlantic seaboard. Contains a brief analysis of the trends established over the six-year period that the study has been in progress, including impact of the program, costs and earnings, factors affecting the size of the investment, prices and volume of output as related to break-even, and trends in incomes of fishermen. The tables contain a detailed comparison of results for the various types and size-classes of fishing craft. The second part, containing a summary of the data collected during the 1957 season, was published in August 1958. The objective of the program is to obtain information on the success of the modernization program and guidance for the development of future policy in this field.

CANNING:

Preventing Struvite Formation in Thermally Treated Seafoods, by Walter A. Zachowski and Carl R. Fellers, U. S. Patent 2,870,025, January 20, 1959. U. S. Patent Office, Washington 25, D. C.

COD:

"The Portuguese Like Canadian Cod," by Richard Grew, article, Foreign Trade, vol. 112, no. 5, August 29, 1959, pp. 16, 17, printed. Queen's Printer and Controller of Stationery, Government Printing Bureau, Ottawa, Canada. Although Portuguese fishing fleets land large quantities of cod from the grounds off the coasts of Newfoundland, Labrador, and Greenland, the total catch is still insufficient to meet the demand in Portugal. Consequently, a large quantity of dried- and wet-salted cod is imported, principally from Iceland, Norway, France, Canada, Germany, and the Faroe Islands. Canadian cod is much in demand especially if the size of fish and market price meet local needs.

CONSUMPTION:

How American Buying Habits Change, 266 pp., illus., printed, $1. U. S. Department of Labor, Washington 25, D. C., 1959. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.) This book describes the improvements in living standards which Americans have achieved since 1888. It describes the changes in the consumption habits of the American people and concentrates on the middle group of consumers--the families of the millions of blue-collar and white-collar workers who make up the vast bulk of our predominantly city life. In the chapter on "meals, menus, and market baskets," it discusses the evolution in diets and food marketing; improvements in nutrition; and food in the family budget.

CRAWFISH:

"Pilot Crawfish Farm," article, Louisiana Conservationist, vol. 11, no. 9, September 1959, pp. 9-10, 28 illus., printed. Louisiana Wild Life and Fisheries Commission, Wild Life and Fisheries Bldg., 400 Royal St., New Orleans 16, La. Describes a projected pilot crawfish farm, reportedly the first of its kind in the world, to be established near Henderson, La., under the supervision of the Louisiana Wild Life and Fisheries Commission. As pounds per acre per year is the yardstick by which crop production is measured, the crawfish culture units will be an acre each. Three of these will be combined into a single pilot farm, where variables can be tested side by side. The results obtained are expected to provide answers to questions on the most efficient size for culture units; best depth of water; preparation of the shoreline; fertilization of ponds; best types of vegetation for food, shade, and protection; number of breeders needed; supplemental feeding; predator control; yield per acre; and the profits in such a venture.

ELECTRICAL FISHING:

"La Pesca con Electricidad" (Electrical Fishing), article, Mar y Pesca, vol. 2, no. 1, January-July 1959, pp. 10-13, illus., printed in Spanish. Instituto Nacional de la Pesca, Havana, Cuba.

ENZYMES:

"Certain Enzymes Can Provide Human Food and General Feed Products from the Trash Fish of the Sea," by W. W. Meinke, article, Texas Engineering Experiment Station News, vol. 10, no. 1, March 1959, pp. 3-6, illus., printed. Texas Engineering Experiment Station, Texas A. & M. College System, College Station, Tex. This article describes experimental work with the use of enzymes to accomplish scaling and visceration of trash fish. Since the catch of trash fish incidental to the shrimp fishery alone is estimated at over 2 billion pounds a year, the economic value to such a process, if it can be applied on an industrial basis, will be great. Products obtained include edible fish, fish solubles, and fish oil.

FISH BEHAVIOR:

"Studies on Social Groupings in Fishes," by C. M. Breder, Jr., Bulletin of the American Museum of Natural History, vol. 117, article 6, pp. 393-482, printed, $1.50. Library, American Museum of Natural History, Central Park West at 79th St., New York, N. Y., 1959.

FISH CULTURE:

Control of Chironomid Larvae in Milkfish Ponds, by Yun-An Tang, and Tung-Pai Chen, Fisheries Series, No. 4, 41 pp., illus., printed, 12 U. S. cents. The Joint Commission on Rural Reconstruction, 25 Nanhai Road, Taipei, Taiwan, China, June 1959.

FISH POPULATIONS:

"Significance of Trap-Net Selectivity in Estimating Population Statistics," by William C. Latta, article, Papers of Michigan Academy of Science, Arts & Letters, vol. 44, 1959, printed. Institute for Fisheries Research, Michigan Department of Conservation, University Museum Annex, Ann Arbor, Mich.

FOOD AND AGRICULTURE ORGANIZATION:

The Application of Science to Inland Fisheries, by E. D. Le Cren, Fisheries Study No. 8, 56 pp.,

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printed, 50 cents. Food and Agriculture Organization of the United Nations, Rome, Italy, 1958. (For sale by Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) Reviews the biological basis of fish production in inland waters (including migratory- and brackish-water fisheries). Describes production and fish cropping; physical and chemical factors influencing algal growth; the principal types of food eaten by fish; the principles underlying the efficiency of conversion of food into fish growth and production; and the concept of the "production" of fish, with emphasis on survival, growth, and mortality. Also reviews the importance of adequate recruitment and the value of artificial hatching and rearing; the possibilities of increased control of natural processes; the relationship between fisheries and other human activities such as farming, dams, and reservoirs; and the past research in limnology and fishery biology.

Current Bibliography for Aquatic Sciences and Fisheries, vol. 2, no. 5, May 1959, 217 pp., processed. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

Fishing Installations in Saline Lagoons, by Ruggero De Angelis, General Fisheries Council for the Mediterranean, Studies and Reviews No. 7, August 1959, 36 pp., illus., processed. GFCM Secretariat, Food and Agriculture Organization of the United Nations, Rome, Italy. Presents the text and plates of technical paper no. 34 on fishing in saline lagoons, given at the Fifth Meeting of the General Fisheries Council for the Mediterranean at Rome on October 13-18, 1958. Describes the historical and modern use of barrages, trelliswork, and screens for trapping migratory fish in coastal lagoons. Includes a number of detailed drawings depicting the construction and method of operation of various types of installations. The description demonstrates the efficiency of this system, in which the young fry can escape and the sea bottom is not disturbed, two disadvantages of all floating devices.

United Kingdom: The Antioxidant in Food Regulations, 1958, Food and Agricultural Legislation, vol. 7, no. 4, XI.9/58.4, 8 pp., printed. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.)

Yearbook of Fishery Statistics, 1957 (International Trade), vol. VIII, 347 pp., processed in English, French, and Spanish, US$4. Food and Agriculture Organization of the United Nations, Rome, Italy, 1959. (Sold in United States by Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) With this issue of the FAO Yearbook, the Fisheries Division resumes publication of statistics relating to international trade in fishery products last presented in 1955, in vol. IV, part II, which covers the years through 1953. This volume devotes one section each to seven groups of fishery commodities defined in the FAO Fishery Statistical Classification--(1) fish, fresh, chilled, or frozen; (2) fish, dried, salted, or smoked; (3) crustaceans and molluscs, fresh, dried, salted, etc.; (4) fish, crustaceans, and molluscs, canned; (5) fish, crustacean, and mollusc preparations, not in airtight containers; (6) aquatic animal oils and fats, crude or refined; and (7) aquatic animal meals and similar products. Each section contains a table summarizing aggregate imports and exports by country for that commodity group; a series of synoptic tables showing the flow of exports from the principal exporting countries to the more important destinations; and a series of tables presenting the details of the exports of individual fishery products from the principal exporting countries. These 7 sections are preceded by 4 general summary tables and followed by notes and a table of conversion factors. Data are given in most tables for 1948 and for 1953 through 1957.

FROGS:

"La Rana Toro, su Existencia y Aprovechamiento en Cuba" (The Bullfrog, its Life History and Cultivation in Cuba), by Federico Gomez de la Maza, article, Mar y Pesca, vol. 2, no. 1, January-July, 1959, pp. 8-9, illus., printed in Spanish. Instituto Nacional de la Pesca, Havana, Cuba.

GEAR:

Commercial Fishing Gear and Fishing Methods in Florida, by J. B. Siebenaler, Technical Series No. 13, 45 pp., illus., printed. Florida State Board of Conservation, Tallahassee, Fla.

GENERAL:

Bulletin of Marine Science of the Gulf and Caribbean, vol. 9, no. 3, September 1959, illus., printed. The Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla. Includes, among others, the following articles: "Spotted and Brown Shrimp Post-Larvae (Penaeus) in North Carolina," by Austin B. Williams; "The Green Turtle (Chelonia mydas mydas) in Florida," by Archie Carr and Robert M. Ingle; "Distribution of the Blue Marlin and Black Marlin in the Indo-Pacific," by James E. Morrow, Jr.; and "Decarboxylation Pathways of Amino Acids in Fish Tissue," by J. Claudatus, P. Gutierrez, and D. Lefemine.

Caracteristicas de Algunos Peces Comerciales y Otros que lo Pueden les en el Futuro (Characteristics of Some Commercial Fishes and Others Which May Become Important in the Future), by L. Navarro, 36 pp., illus., printed in Spanish. Secretaria de Marina, Mexico, D. F.

Fisheries Research Papers, vol. 2, no. 2, April 1959, 98 pp., illus., printed. Department of Fisheries, Olympia, Wash. Includes among others the following articles: "The Fishery for Herring (Clupea pallasii) on Puget Sound," by R. Walter Williams; "Survival of Downstream Migrant Salmon Passing Alder Dam in an Open Flume," by Dale E. Schoeneman; "The Larval

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Development of the Sand Sole (Psettichthys melanostictus)," by Cleveland P. Hickman, Jr.; "Commercial Salmon Fishing Intensity in Puget Sound, 1939-1955," by Charles O. Junge, Jr.; "Efforts of Stream Dredging on Young Silver Salmon, Oncorhynchus kisutch, and Bottom Fauna," by William H. Rees; "Tagging Experiments on Sablefish at Holmes Harbor, Wash.," by Alonzo T. Pruter; "Migration and Fishing Mortality Rates of Columbia River Spring Chinook Salmon in 1955," by Henry O. Wendler; "A Study of Localized Predation on Marked Chinook Salmon Fingerlings Released at McNary Dam," by Richard B. Thompson; and "Calculated Minimum Contributions of Washington's Hatchery Releases to the Catch of Salmon on the Pacific Coast and the Coasts Assessable to Hatchery Operations," by C. H. Ellis and R. E. Noble.

Increasing Profits from Fish, by John P. Carroll, Kirby M. Hayes, and Paul Paradis, Publication No. 340, 8 pp., illus., printed. Mailing Room, Extension Service, University of Massachusetts, Amherst, Mass. This leaflet for food retailers outlines briefly and concisely points to be observed in buying, storing, selling, and increasing sales of top-quality fish in order to achieve increasing profits. Humorously illustrated, it is of practical value to food stores handling fishery products.

"Meeting Tomorrow's Fish and Wildlife Needs," by Arnie J. Suomela, article, Extension Service Review, vol. 30, no. 6, June 1959, pp. 127, 138 illus., printed, single copy 15 cents. Federal Extension Service, U. S. Department of Agriculture, Washington 25, D. C. (For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.) Discusses program planning in the U. S. Fish and Wildlife Service to meet future needs. The interrelation and interdependence of all resources are stressed. The Bureau of Commercial Fisheries seeks to maintain fisheries at the point of maximum sustained yield with peak efficiency for the fisherman's effort. Closer cooperation between the Departments of Agriculture and Interior and the furtherance of conservation education are required to achieve program objectives.

The Open Sea, Its Natural History, Part II: Fish and Fisheries (with Chapters on Whales, Turtles, and Animals of the Sea Floor), by Alister Hardy, 322 pp., illus., printed, $7.50. Houghton Miflin Co., 2 Park St., Boston 7, Mass. Describes the history and habits of fish in general, life on the ocean floor, fish parasites, herring, haddock, and the fishing industry.

Statistical Abstract of the United States, 1959 (80th Annual Edition), 1054 pp., illus., printed, $3.50 (buckram). U. S. Bureau of the Census, Washington, D. C., 1959. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.) This is the standard summary of statistics for the most recent year available on the social, political, and economic organization of the United States. It contains, among others, a section on fisheries which presents briefly statistics relating to quantity and value of catch, fishermen and fishing craft, catch of principal species, canned and frozen fishery products, and foreign trade in fishery products. The principal sources of these data on fisheries are reports published by the Fish and Wildlife Service.

Turn to the Sea, by Athelstan Spilhaus, 46 pp., illus., printed. National Academy of Sciences, National Research Council, Washington, D. C., 1959. An interestingly-written and informative narrative describing the resources and potentialities of our oceans. It discusses recent and important developments in oceanography and the marine sciences and includes a chapter on fishery resources.

United States Coast Pilot No. 7--California, Oregon, Washington, and Hawaii, 383 pp., printed, $3. Coast and Geodetic Survey, U. S. Department of Commerce, Washington 25, D. C. The latest edition of this publication supersedes the 1951 edition of Coast Pilot 7 and cancels the 1950 edition of Coast Pilot 10, which formerly covered the Hawaiian Islands in a separate volume. The eighth edition covering the Pacific Coast and Hawaii is based on the work of the Coast and Geodetic Survey and includes the results of Coast Pilot field inspections made in 1957. It contains nautical information that required more than 800 pages in the previous books. New editions are published about every seven years, and supplements, containing changes and new information, are published annually and distributed free. The latest supplement together with Notices to Mariners subsequent to it will correct the Coast Pilot to date. A combination atlas, encyclopedia, geography text, and nautical guidebook, the Coast Pilot contains information of importance to the navigator of United States coastal waters. Most of this information cannot be shown conveniently on the standard nautical charts and is not readily available elsewhere. Subjects include landmarks, navigation regulations, channels, anchorages, dangers, routes, weather, ice, pilotage, and port facilities. The Pacific Coast has phenomena that are all its own. San Francisco's fogs are of three kinds: the summer afternoon sea fog that forms a cliff of white vapor and moves inland at an average of 16 miles an hour; the tule fog which is a low-lying dense land or river fog that forms on winter mornings and drains slowly seaward; and a nondescript fog, consisting of a mixture of city smoke, dust and vapor, which drifts slowly seaward in the morning, and returns as a dark cloud about 1 p.m. before the west wind. The Santa Ana, a desert wind that blows offshore, usually in or near San Pedro Bay, may reach a speed of 52 knots and gives the mariner little warning. Rocks and currents make coastwide navigation dangerous, especially in thick weather; many of the rocks are marked by kelp, which can be seen on the surface during the summer and autumn. The first Pacific Coast Pilot was written a little over a century ago by George Davidson, one of the Survey's most renowned scientists, and appeared in the Survey's report for 1858. Davidson's

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successors, although they must speak the language of the sea, have kept high standards of clarity and English.

INDIA:

The Indo-Norwegian Project in Kerala, by Per Sandven, 147 pp., illus., printed. Norwegian Foundation for Assistance to Underdeveloped Countries, Oslo, Norway, 1959. Describes the work of the Foundation, a state-sponsored and public-supported organization, in assisting to develop the fishing and fish-handling and marketing industries, as well as health and sanitation facilities, in the Indian state of Kerala. The project was undertaken under the auspices of the United Nations expanded program of technical assistance, except that the funds are applied not only for providing technical experts, services, and training, but also for capital assistance in the form of equipment and machinery. The project was initiated in 1952 with the signing of a tripartite agreement between India, Norway, and the United Nations and three fishing communities in this southwestern India state, which were selected for aid. Accomplishments have been encouraging in mechanization of fishing boats, provision for repair facilities, introduction of new types of fishing gear, improvement of processing and curing methods, building of ice-producing plants, supplying insulated trucks and vessels for transport of fresh fish, organization of fishermen's cooperatives, improvement of environmental sanitation with main stress on the supply of drinking water, and establishment of a health station. The author reminds us in his conclusion that "The underdeveloped nations need foreign experts and capital in their struggle to achieve greater economic growth. They must be helped to be able to help themselves build their countries."

Notes on Eggs, Larvae and Juveniles of Fishes from Indian Waters. 1--XIPHIAS GLADIUS (Linnaeus), by S. Jones, 5 pp., illus., printed. (Reprinted from Indian Journal of Fisheries, vol. 5, no. 2, 1958, pp. 357-361.) Central Marine Fisheries Research Station, Marine Fisheries P. O., Mandapam Camp, South India.

The Tuna Live-Bait Fishery of Minicoy Island, by S. Jones, 8 pp., illus., printed. (Reprinted from Indian Journal of Fisheries, vol. 5, no. 2, 1958, pp. 300-307.) Central Marine Fisheries Research Station, Marine Fisheries P. O., Mandapam Camp, South India.

INTERNATIONAL CONFERENCES:

Fish Processing Technologists Meeting, Rotterdam, June 25-29, 1956, Symposium Papers Nos. 1-25, processed. Food and Agriculture Organization of the United Nations, Rome, Italy. Contains papers on: "Use of Preservatives and Antibiotics in the Preservation of Fresh Fish," by H. L. A. Tarr; "Antibiotics as Aids in Fish Preservation. II - Further Studies on Fish Fillets," by Peter Yakoubovsky-Lerke and Lionel Farber; "The Use of Antibiotics for Extending the Freshness of Fish and Shellfish," by R. Pasternack, A. S. Malaspina, C. L. Wrenshall, and R. C. Ottke; "Effectiveness of Aureomycin on Keeping Quality of Several Demersal Fish," by T. Tomiyama, Y. Yone, and S. Kuroci; "Aureomycin as an Ice Additive," by B. Albertsen; "Experiments with Bacteriostatic Ices on Fish," by J. Bystedt and A. Liljemark; "Can We Extend the Keeping Time of Chilled Fish with Antibiotics," by Sverre Hjorth-Hansen; "Icing Cod with Salt Water Ice," by Poul Hansen; "Fresh Water Preservation," by H. L. A. Tarr; "Observations on the Use of Prechilled Brines for the Temporary Storage of California Sardines and Mackerel," by Lionel Farber; "Some Observations Concerning the Brine Cooling of Fish Aboard a Fishing Vessel," by Joseph W. Slavin; "Fresh Fish Quality Assessment in the Commercial Fish Inspection," by Poul Fr. Jensen; "The Sensory Assessment of Iced White Fish by a Panel Technique," by J. M. Shewan and A. C. S. Ehrenberg; "Danish Studies of the Storage of 'Wet' Fish at Temperatures Close to 0° C. Procedure for Organoleptic, Bacteriological and Chemical Assessment of Freshness," by Poul Hansen; "Recent Work on the Use of 'Total Volatile Bases' and Trimethylamine Contents and Tetrazolium Salt Reduction for Assessing the Quality of Iced Fish," by J. M. Shewan and J. Liston; "Preliminary Results of Some New Tests for Fresh-Fish Quality;" "The Objective Assessment of Raw Fish Quality," by Lionel Farber and P. Y. Yerke; "A Rapid Method for the Estimation of Volatile Bases in Fish Muscle," by W. A. Montgomery; "The Applicability of the Vacuum Distillation Technique for the Determination of Volatile Acids and Volatile Bases in Fish Flesh," by Antonio A. Da Costa, Tetuo Timiyama, and Joseph W. Stern; "Public Health Aspects of the Use of Antibiotics in Foods," by Chr. Engel; "An Enzymatic Method for Evaluating the Acceptability of Bactericidal Ice," by W. Partmann; "The Use of Ice as a Counter Agent to an Anaerobic Environment in Iced Demersal Fish, by W. A. MacCallum; and "Appreciation de l'Alteration du Poisson Frais par un Examen Organoleptique Systematique" (Estimation of Fish Spoilage by Means of Systematic Organoleptic Examination), by France Soudan, J. Bazin, G. Chapel, E. Seynave, and A. Daknoff. These papers are available individually from the above mentioned address.

IRELAND:

Fisheries (Amendment) Act, 1958, No. 15 of 1958, 59 pp., printed in English and Gaelic, 3s 6d. (about 49 U. S. cents). Government Publications Sale Office, G. P. O., Arcade, Dublin, Ireland.

Fisheries (Consolidation) Act, 1959, No. 14 of 1959, 178 pp., printed, 10s 6d. (about US$1.47). Government Publications Sale Office, G. P. O., Arcade, Dublin, Ireland.

ISRAEL:

Bamidgeh (Bulletin of Fish Culture in Israel), vol. 11, no. 2, June 1959, 42 pp., illus., printed in English and Hebrew. Joint Agricultural Extension Center, Division of Fisheries, Ministry of Agriculture, Tel Aviv, Israel. Includes, among others, the following articles: "Fish Pond Culture and the Water Economy in Israel," by S. Tal; and "A Key to the Tilapia Species Found

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in Pond Areas," by A. Yashour and A. Hefetz.

Fishermen's Bulletin, no. 20, June 1959, 32 pp., illus., printed in Hebrew with English abstracts. Fishermen's Bulletin, P. O. B. 699, Haifa, Israel. Contains, among others, the following articles: "Tuna Fishing on F/V Shinio Maru," by J. Carmel; and "Trawler and Trawl Gear in Action, II," by M. Ben-Yami.

JAPAN:

Bulletin of Takai Regional Fisheries Research Laboratory, no. 23, February 1959, 91 pp., illus., printed, in Japanese with English summaries. Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-Ku, Tokyo, Japan. Includes, among others, the following articles: "Fundamental Study of the Detection of Fish by Supersonic Wave. II--Supersonic Reflection Coefficient of Fish Net," by S. Kawada and C. Yoshimuta; "Studies on the Effects of Net Preservatives. I--Preserving Effects Dependent on Conditions Applying a Commercial Copper Naphthenate to Twine," by S. Takayama, Y. Shimozaki, and K. Kanna; "Studies on Muscle Proteins of the Squid," by J. J. Matsumoto; and "Studies of Preservation of Marine Products by Chemical Preservative. IV--Effect of Nitrofuran Compounds on the Keeping Quality of Raw Fish and Shellfish," by S. Tetsumoto.

JELLIED MEAT:

"Decomposed Meat of Tunas and Marlins. I--Observation and Statistical Analyses of Meats Collected in the Solomon Sea During the Summer, 1953; II--Components and Development of the Jellied Meat," by Suezo Asakawa and Akira Suda, article, Nankai-ku Suisan-Kenkyusho Hokoku, vol. 5, 1957, pp. 169-186, printed in Japanese. Nankai-ku Suisan-Kenkyusho Sanbashidori, Kochi-shi, Japan.

LAMPREYS:

The Lampreys of California, by Willis A. Evans, Robert C. Tharratt, and Leo Shapovalov, Inland Fisheries, Informational Leaflet No. 22, 3 pp., processed. California Department of Fish and Game, 722 Capitol Ave., Sacramento 14, Calif., August 1958. Describes the three kinds of lampreys found in California: the Pacific lamprey, Entosphenus tridentatus; the brook lamprey, Lampetra planeri; and the river lamprey, Lampetra ayresii. Lampreys may be distinguished from eels and other true fishes by the possession of a circular sucking mouth, without functional jaws, the lack of paired fins, and the presence of seven external gill openings instead of the single gill opening of true fishes. Although said to be palatable, they are seldom used as a food fish. They pose a considerable problem as a parasite on food and game fish but are not nearly as dangerous a threat to fish populations as the Atlantic sea lamprey which has invaded the Great Lakes in recent years.

MARKETING:

Market Survey on Canned and Frozen Sea Foods in France, Market Survey Series No. 20, 12 pp., illus., printed. Ministry of Commerce and Industry, Government of India, New Delhi, India, 1959. This pamphlet presents results of an investigation of potential markets in France for frozen and canned shrimp, frog legs, lobster tails, and other shellfish, in order to assist Indian manufacturers and exporters in establishing sales there. Topics discussed are the size and nature of the market, regulations and other requirements, and channels of trade. Also included are tables summarizing French imports, exports, and importers of canned and frozen shellfish.

NORWAY:

Fisket-Feltet (Fishing Field), vol. 1, no. 1, July 1959; vol. 1, no. 2, August 1959, 8 pp., illus., printed in Norwegian, 50 Øre per issue (7 U. S. cents). Fiske-Feltet, Øvregt. 7, Alesund, Norway. The first two issues of a new fishery periodical.

NUTRITION:

"The Effect of Concentrates of Polyunsaturated Acids from Tuna Oil upon Essential Fatty Acid Deficiency," by Orville S. Privett, Erik Aaes-Jorgensen, Ralph T. Holman, and Walter O. Lundberg, article, Journal of Nutrition, vol. 67, March 19, 1959, pp. 423-432, printed. The Wister Institute of Anatomy and Biology, 36th St. at Spruce, Philadelphia 4, Pa.

OCEANOGRAPHY:

Annual Report of the Oceanographic Institute, Fiscal Year 1957-1958, 21 pp., processed. The Oceanographic Institute, Florida State University, Tallahassee, Fla., 1959. Describes the functions and activities of the Oceanographic Institute during the fiscal year July 1, 1957, to June 30, 1958.

"Oceanographers Need Ships," by Richard Litell, article, Science News Letter, vol. 76, no. 12, September 19, 1959, pp. 186-187, illus., printed. Science Service, Inc., 1719 N St., N. W., Washington 6, D. C. Discusses a recent report by the National Academy of Sciences-National Research Council on the current status of the marine sciences in this country which contains a series of "minimal" recommendations for the improvement of oceanographic research. It urges the Government to expand its support of the marine sciences at a rate which would result in at least a doubling of basic research activity during the next ten years. It also urges that this increased support be accompanied by a new program of ocean-wide surveys, requiring a doubling of the present research effort. According to the author, "Neither of these recommendations can be carried out without an increase in the number of research ships available for exploration. With specific regard to ships, therefore, the Committee further recommended that a shipbuilding program be started, aimed at replacing, modernizing, and enlarging the number of ocean-going ships now being used for research, surveying and development."

OYSTER PESTS:

The Biology and Control of the American Whelk Tingle UROSALPINX CINEREA (Say) on English Oyster Beds, by D. A. Hancock, Fishery

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Investigations, Series 2, vol. 22, no. 10, 69 pp., illus., printed, 17s 6d. (about US$2.45). Her Majesty's Stationery Office, York House, Kingsway, London W. C. 2, England, 1959.

OYSTERS:
"Oyster Farming in Australia," by L. T. Sardone, article, World Fishing, vol. 8, no. 9, September 1959, pp. 61-63, illus., printed. John Trundell, Ltd., St. Richards House, Eversholt St., London, N. W. 1, England. Describes methods used in the cultivation of the Sydney rock oyster in New South Wales. This oyster is cultivated by various methods at points along 1,300 miles of the eastern Australian coastline. The bulk of oysters marketed in Australia is produced in New South Wales from oyster farms leased out by the Government, and production from New South Wales accounts for over 95 percent of the Australian total.

PHILIPPINES:
The Philippine Journal of Fisheries, vol. 5, no. 1, January-June 1957, 91 pp., illus., printed. Department of Agricultural and Natural Resources, Manila, Philippines. Contains articles on: "The Balat Fisheries of Maqueda Bay, Samar, Philippines," by Jose R. Montilla and Hilario C. Antonio; "Growth Types of the Pacific Pilchard (Sardinops caerulea Girard): An Analysis of Samples of the Pacific Pilchard on the Basis of Length-Frequency Distribution at Different Ages," by Inocencio A. Ronquillo; and "Marine Fisheries of the Central Visayas," by Santos B. Rasalan.

PIKE BLENNY:
Some Aspects of the Behavior of the Blennioid Fish CHAENOPSIS OCELLATA (Poey), by C. Richard Robins, Craig Phillips, and Fanny Phillips, 10 pp., illus., printed. (Reprinted from Zoologica, Scientific Contributions of the New York Zoological Society, vol. 44, part 2, July 20, 1959, pp. 77-83.) Contribution No. 230, The Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

PLAICE:
The Spawning of Plaice in the North Sea, by A. C. Simpson, Fishery Investigations, Series 2, vol. 22, no. 7, 113 pp., illus., printed, £1 17s 6d. (about US$5.25). Her Majesty's Stationery Office, York House, Kingsway, London W. C. 2, England, 1959.

POISONOUS FISH:
The Venomous and Poisonous Fish of Guadeloups, by A. Ebrom, Fishery Publication No. 3, 14 pp., illus., translated from French. Caribbean Commission, Kent House, Port-of-Spain, Trinidad, W. I., 1959.

PRESERVATION:
"Boric Acid-Free Preservation of Fresh Shrimps and Shrimp Meat--II," by W. Ludorff, Chr. Henningss, and K. E. Neb, article, Zeitschrift fur Lebensmittel-Untersuchung und - Forschung, vol. 108, 1958, pp. 330-341, printed in German. J. F. Bergmann, Leopoldstrasse, 175, Munich 23, Germany.

PRESERVATION BY IRRADIATION:
Radiation Preservation of Food, PB-151493, 461 pp., illus., printed, $5. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., 1959.

QUALITY:
"Improvement in Quality of Iced White Fish. Factors Affecting Quality and Tetrazolium Color Test," article, Food Investigation 1957, Report of the Food Investigation Board (Great Britain), pp. 3-4, printed. Department of Scientific and Industrial Research, Charles House, 5-11 Regent St., London S. W. 1, England, 1958.

"Improvement in Quality of Iced White Fish. Temperature Conditions at Inland Markets and Retailers' Premises," article, Food Investigation 1957, Report of the Food Investigation Board (Great Britain), pp. 7-9, printed. Department of Scientific and Industrial Research, Charles House, 5-11 Regent St., London, S. W. 1, England, 1958.

QUALITY CONTROL:
Setting Up a Quality Control and Technical Development Laboratory, by James R. Irving, Technical Aids for Small Manufacturers No. 65, 4 pp., printed. Small Business Administration, Washington 25, D. C., June 1959. A one-man testing laboratory to check incoming materials can be the first step in establishing quality control and technical development in a plant. Savings from improved uniformity in manufacturing conditions and in product quality can often make such a project self-supporting. Consistent product development can later turn the laboratory into a money-maker. A long-range new products program will eventually insure the firm's continued existence, profitability, and growth.

REFRIGERATION:
The Role of Refrigeration in the World's Food Supply, by Mogens Jul, Publication No. 12, 23 pp., illus., processed. Danish Meat Research Institute, Roskilde, Denmark, 1959. This study is the outline for an address at the opening session of the 10th International Congress of Refrigeration, Copenhagen, August 19, 1959. The author discusses the need for refrigeration during processing and storage, increased need for transportation of food, trends in modern food distribution, nutritive problems, effect of extra handling on cost, effect on taste, and the food of the future. It also contains statistical tables showing data on refrigeration and refrigerated products. Some information on fishery products is included.

RESEARCH VESSEL:
"The Design of a Research Stern Fishing Trawler," by J. C. Esteves Cardoso and C. R. Caldiera Saraiva, article, World Fishing, vol. 8, no. 9, September 1959, pp. 48-50, illus., printed. World Fishing, John Trundell, Ltd., St. Richards House, Eversholt St., London N. W. 1, England. Part 1 of a paper read at the meetings of the Institution of Naval Architects held in Lisbon in June 1959. Explains in detail the

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need for expansion of the Portuguese fishing fleet and exploration for new fishery resources. According to the author the association of Trawler Owners hopes to meet this need with a new research vessel of the most modern design; fitted for stern trawling and equipped with air conditioning, twin Diesel engines, research laboratories, facilities for fish processing, and various types of navigation and fish-finding aids. The types of gear selected are specially concerned with trawling, long-lining, and bait fishing for tuna.

SALMON:

Character of the Migration of Pink Salmon to Fraser River Spawning Grounds in 1957, by F. J. Ward, printed. International Pacific Salmon Fisheries Commission, New Westminster, B. C., Canada.

"Retinal Responses of Pink Salmon Associated with its Downstream Migration," by M. A. Ali and W. S. Hoar, article, Nature, vol. 184, no. 4680, July 11, 1959, pp. 106, 107, illus., printed. Nature, MacMillan & Co., Ltd., St. Martin's St., London W. C. 2, England.

SALT FISH:

"Some Preliminary Experiments Towards Developing a Method of Salt Curing Fish Suitable for West Indian Conditions," by W. A. King Webster, article, The West Indies Fisheries Bulletin, no. 3, May-June 1959, pp. 5-9, processed. Ministry of Natural Resources and Agriculture, Federal House, Port-of-Spain, Trinidad, W. I. Describes the technique employed in wet salt-curing carite, a locally-caught fish, and the results obtained, including acceptability, length of storage, cost, and suitability of containers.

SARDINES:

"Experiments in Cooking Sardines--I," by R. Meesemaecker and Y. Sohier, article, Food Manufacture, no. 34, April 1, 1959, pp. 148-153, printed. Food Manufacture, Leonard Hill, Ltd., Eden St., London N. W. 1, England.

SHRIMP:

"Resumen de Situacion de Camarones en Panama" (Summary of the Shrimp Situation in Panama), by Juan L. Obarrio, article, Mar y Pesca, vol. 2, no. 1, January-July 1959, pp. 31-33, printed in Spanish. Instituto Nacional de la Pesca, Havana, Cuba.

TAIWAN:

Report of the Institute of Fishery Biology of Ministry of Economic Affairs and National Taiwan University, vol. 1, no. 3, June 1959, 64 pp., illus., printed in English with Chinese summaries. The Institute of Fishery Biology, No. 89, Sec. III, South Sin Sun Road, Taipei, Taiwan, China. Contains among others, the following articles: "Studies on the Elasmobranch Fishes from Formosa. Part II--A New Carcharoid Shark, Carcharias yangi, from Formosa," by H. T. Teng; "The Distribution and Fluctuation of Some Demersal Fishes of Taiwan Straits," by F. H. Liu and G. C. Chen; "Anchovies Found in Taiwan," by S. C. Shen; and "A List of Edible Mollusks of Taiwan," by T. Y. Ho.

TENNESSEE VALLEY AUTHORITY:

1959 Annual Report, 13 pp., illus., printed. Fish and Game Branch, Division of Forestry Relations, Tennessee Valley Authority, Knoxville, Tenn. Discusses briefly accomplishments of 25 years of TVA fish and game activities. The most notable, of course, has been the expansion in the area of fishing water from 116,000 to 600,000 acres. The report mentions that TVA by law must operate its reservoirs for flood control, navigation, and power production. Development of fish and wildlife resources is secondary but, fortunately, there is no great conflict between the two interests. Current activities include population studies, tagging studies, fish stocking, water temperature and spawning data collection, enclosed fishing docks, and encouragement of sport and commercial fishing.

TERRITORIAL WATERS:

The Icelandic Fishing Limits, 20 pp., printed in German and English. Verband der Deutschen Hochseefischereien E. V., (23) Bremerhaven-F., Postfach 340, Germany, June 1959. In September 1958, the Icelandic Government submitted to the General Assembly of the United Nations a Memorandum in which it attempted a detailed justification of the extension of its fishing limits from 4 to 12 nautical miles. In its Memorandum, the Government of Iceland relies on legal, biological and economic arguments. This article presents the views of other nations of Europe regarding Iceland's arguments on the extension of its fishing limits.

TRADE LIST:

The Office of Economic Affairs, Bureau of Foreign Commerce, U. S. Department of Commerce, Washington 25, D. C., has published the following mimeographed trade list. Copies may be obtained by firms in the United States from that office or from Department of Commerce field offices at $2 a copy.

Fish and Whale Meat Meal--Producers--Peru, 4 pp. (June 1959). Lists the names and addresses of some sixty fishing companies operating fish meal plants. Only three of these plants are listed as producers of whale-meat meal.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, Producers, Refiners, and Exporters, Ecuador, 11 pp. (July 1959). Lists the names and addresses, size of firms, and types of products handled by each firm. Includes firms dealing in fish oils.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, Producers, Refiners, and Exporters, Haiti, 6 pp. (July 1959). Lists the names and addresses, size of firms, and types of products handled by each firm. Fish oils not listed specifically by any firm.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, Producers, Refiners, and Exporters, The Netherlands, 22 pp. (July 1959). Lists the names and addresses, size of firms, and types of products handled by each firm. Includes firms dealing in fish oils.

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TUNA:

"Sobre Atuns de Angola" (On Tuna of Angola), by H. Vilela and R. Monteiro, article, Boletim da Pesca, vol. 12, no. 64, September 1959, pp. 11-54, illus., printed in Portuguese with abstracts in French. Boletim da Pesca, Avenida da Liberdade, 211-4, Lisbon, Portugal.

UNDERWATER TELEVISION:

"Underwater TV and the Fisheries (2)," by Jay Russell, article, World Fishing, vol. 8, no. 8, August 1959, pp. 50-54, illus., printed. John Trundell (Publishers), Ltd., St. Richards House, Eversholt St., London N. W. 1, England. In the first part of this article, published in the June issue of World Fishing, the author described some of the work already accomplished by underwater television. In this second part, he evaluates the potential of underwater television and appraises its future for marine research and for use in the fisheries. He concludes that its primary importance will be for studying fishing gear and the reactions of fish to gear.

UNION OF SOUTH AFRICA:

Fishing Industry Research Institute, Twelfth Annual Report of the Director, 1 January 1958-31 December 1958, 70 pp., illus., printed. Fishing Industry Research Institute, Cape Town, Union of South Africa. Includes functions and activities of the Institute and brief accounts of progress in its program of research during 1958. Presents the results of investigations covering fresh, salted and dried, fried, and canned fish; fish meal; stickwater recovery; fish flour; and routine inspections and analyses.

UNITED KINGDOM:

Grimsby, The World's Premier Fishing Port, 150 pp., illus., printed. The Grimsby Fishing Vessel Owners' Association, Fish Dock Road, Grimsby, England, 1959. An interesting handbook, illustrated with both photos and sketches, describing the historical, technological, economic, and political aspects of the British fishing port of Grimsby. It contains chapters on the years of development; the fishing industry, and how it works; Grimsby Fishing Vessels Owners' Association; development of the fishing vessel; development of fishing gear; radio in the fishing industry; the fishermen of Grimsby; training programs; sales by auction; fish merchandising; cold storage; export of fish; British cod liver oil; coal and oil bunkering; shipbuilding, repairing, and engineering; subordinate trades; research; meteorological services; Ministry of Agriculture, Fisheries, and Food; The White Fish Authority; and fish facts. Also included are plan of the docks, map of the fishing grounds, and diagrams of trawler and seine-net vessels.

Herring Industry Board, Twenty-Fourth Annual Report, 1958, 54 pp., printed, 3s. (42 U.S. cents). Her Majesty's Stationery Office, York House, Kingsway, London W. C. 2, England, July 1959. Reports on the state of the herring fisheries of the North Sea; commercial and statutory matters concerning the Herring Industry Board, the catchers, and shore-based sections of the industry; marketing; production, research, and development; and related subjects. Contains statistical tables showing the landings and value of catches and disposal of landings during the winter, summer, and autumn seasons; composition of fleets in the Irish Sea area and East Anglia; curing strength and production of cured herring; imports of fresh and frozen herring; disposal of the United Kingdom's total herring landings, excluding imports; and applications for grants and loans. The appendix consists of a summary of pertinent directions having seasonal effect which were issued during 1958. The report states that preparations were made during the year for the introduction of a new Convention to replace the International Fisheries Convention of 1946. A feature of the new Convention which was absent from the earlier one is the inclusion of herring among the species which may become the subject of measures of conservation.

VESSELS:

"Methods of Assessing Fishing Craft Depreciation," by John Proskie, article, Trade News, vol. 12, no. 2, August 1959, pp. 8-9, illus., printed. Director of Information and Educational Service, Department of Fisheries, Ottawa, Canada. One expense item of considerable importance in any fishing enterprise is depreciation, although it is a noncash expenditure in any particular year. In the studies conducted by the Canadian Department of Fisheries, the "straight-line" method of computing depreciation is used. This consists of simply dividing the total anticipated depreciation (wear, tear, and obsolescence) by the number of years the asset is expected to last. "Although certain parts wear out faster than others, a depreciation rate of $7\frac{1}{2}$ percent closely approximates in fact the average yearly wear and tear of boat and equipment over a period of about 14 years," states the author. Since depreciation is a cost of production, like any other, it should be kept as low as possible. However, the basic principle still holds true that cost accounts should show the true facts in respect to expenditures and returns for the enterprise and the net worth of the asset.

VITAMIN A:

"Vitamin A_1 Aldehyde in the Eggs of the Herring (Clupea harengus L.) and Other Marine Teleosts," by P. A. Plack, S. K. Kon, and S. Y. Thompson, article, The Biochemical Journal, vol. 71, March 1959, pp. 467-476, printed. The Biochemical Journal, Cambridge University Press, Bentley House, 200 Euston Rd., London N. W. 1, England.

YEARBOOKS AND DIRECTORIES:

Business Statistics, 1959 Edition (A Supplement to the Survey of Current Business), 357 pp., printed, $2.25. Office of Business Economics, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.) A historical compendium and reference book containing monthly and annual data for over 2,600 statistical measures of the U. S. economy.

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CONTENTS (CONTINUED)

TRENDS AND DEVELOPMENTS (Contd.):	Page
Standards:	
Proposed Standards for Frozen Raw Headless Shrimp Reviewed at Meetings	60
U. S. Foreign Trade:	
Edible Fishery Products, August 1959	61
Groundfish Fillet Imports, September 1959	61
Imports of Canned Tuna in Brine Under Quota	61
U. S. Production of Fish Sticks and Portions, July-September 1959	62
United States Fishery Landings, January-August 1959	63
Wholesale Prices, October 1959	64
FOREIGN:	66
International:	
Food and Agriculture Organization:	
Fishery Statistics Training Center Held in Denmark	66
Fisheries Surveys Training Center Held in Tanganyika	66
Sardine Meeting Calls for International Cooperation in Research	67
International North Pacific Fisheries Commission:	
Sixth Annual Meeting Held in Seattle	67
International Pacific Halibut Commission:	
Dart Tag Used by Commission for First Time to Tag Halibut	68
United States-Japanese Tuna Conference:	
Plenary Sessions and Committee Meetings Held October 1-11	69
United States and Russia Exchange Scientific Fishery Knowledge	71
Australia:	
All-Welded Aluminum Alloy Spiny Lobster Processing Vessel	72
Most Restrictions on Imports from Dollar Area Removed	73
Spiny Lobster Exploratory Fishing	74
Shrimp Exploratory Fishing	74
Belgium:	
Fishing Industry Faces a Crisis	74
Shrimp Fishing Industry Concerned over Prices	75
Chile:	
Credit Assistance Extended to Fishing Industry	75
Exports of Fishery Products, 1955-1958	75
Cuba:	
Closed Season for Snook and Croaker Ended	76
Fishermen and Packers Fix Spiny Lobster Ex-Vessel Prices	76
Spiny Lobster Pots Prohibited on the North Coast	76
Egypt:	
Shrimp is Principal Processed Fishery Product	77
El Salvador:	
Fishery Trends, October 1959	77
French West-Africa:	
Tuna Fishery, 1958/59	77
German Democratic Republic:	
Fishing Industry Provides only 25 Percent of Needs	78
German Federal Republic:	
Exploratory Fishing for 1959/60 Planned	78
Fishery Landings, 1958	79
Fourth Stern-Type Trawler Placed in Service	79
Gear Expert Demonstrates Improved Midwater Trawling	79
Imports and Exports of Marine Oils, 1958 and January-June 1959	81
Production Methods for Fish Flour Developed	82
Iceland:	
Fisheries Trends, September 1959	82
Herring Fishery and Whaling Trends, September 1959	82
Market for South Coast Herring in Soviet Bloc Improved	83
India:	
Russian Fishery Biologist to Survey Bay of Bengal	83
Iran:	
Fisheries Trends, September 1959	83
Japan:	
Canned Tuna-in-Brine Exports to United States, January-May 1959	84
Plans for 1959/60 Whaling Season	84
Resin-Like Substance from Fish Oils Developed	84
Korea:	
Fisheries Trends, August 1959	85
Review of Fishing Industry, 1958	85
Liberia:	
Fisheries Trends, October 1959	88
Martinique:	
Imports of Fishery Products Under License Included in 1959 Dollar Credits	89

FOREIGN (Contd.):	Page
Mexico:	
Canned Fish Pack, 1958	89
Cuban Fishing Vessels Barred from Port of Isla Mujeres	90
Ensenada Area Fishery Trends, September 1959	90
Export Duty on Fish Meal Lowered	90
Shrimp Fishery Trends, September 1959	91
Netherlands:	
Increase in Whale Production Planned	91
New Zealand:	
Restrictions Removed on Some Imports from the United States	92
Nigeria:	
Survey of Tuna Stocks by United States Company Proposed	92
Norway:	
Fisheries Trends, September 1959	93
Quota for 1959/60 Whaling Season Established	93
Pakistan:	
Main Features of the New Fish Harbor Completed	93
Peru:	
Exports and Imports of Marine-Animal Oils, 1957 and 1958	93
Exports of Marine Products, January-June 1959	94
Fisheries Production Expands Rapidly	94
Restrictions on Fish Meal Plant Expansion Modified	95
Portugal:	
Canned Fish Exports, January-June 1959	95
Canned Fish Pack, January-June 1959	95
Fisheries Trends, January-June 1959	96
Exports of Canned Sardines to all Destinations and to West Germany, 1954-58	96
Cod-Fishing Fleet Has Poor Season	96
Embargo on Export of Algae (Seaweed) Lifted for Single Shipment	97
Funds Provided by Government for Financing Fishing Industry Projects	97
Proposed Barter Deal with Greece Includes Fishing Vessels	97
Sweden:	
Exports of Fishery Products to East Germany Stopped	97
One Small Cannery Stops Packing Fish	98
Turkey:	
Landings of Aquatic Products, 1958	98
Uganda:	
French Expert to Survey Pond Fisheries	98
Union of South Africa:	
Edible Fish Flour Produced on Commercial Scale	99
U. S. S. R.:	
New Type Floating Cannery and Mothership for Herring Fleet	99
Plans to Increase Fleet of Larger Fishing Vessels Fivefold	99
United Kingdom:	
Fishing Subsidies and Grants Revised for 1960/61	100
Uruguay:	
Fish Meal Plant Donated by United Nations	101
Yugoslavia:	
Japanese Tuna Vessel Lands Trip	101
FEDERAL ACTIONS:	102
Interstate Commerce Commission:	
Brined Fish Under Refrigeration May be Shipped by Exempt Carrier	102
New Railway Express Agency Contracts Approved	102
Department of the Treasury:	
Bureau of Customs:	
Decision Rendered on "Immediate Container" for Frozen Fish Blocks	102
Eighty-Sixth Congress (First Session)	104
FISHERY INDICATORS:	105
Chart 1 - Fishery Landings for Selected States	105
Chart 2 - Landings for Selected Fisheries	106
Chart 3 - Cold-Storage Holdings and Freezings of Fishery Products	107
Chart 4 - Receipts and Cold-Storage Holdings of Fishery Products at Principal Distribution Centers	108
Chart 5 - Fish Meal and Oil Production--U. S. and Alaska	108
Chart 6 - Canned Packs of Selected Fishery Products	109
Chart 7 - U. S. Fishery Products Imports	110
RECENT FISHERY PUBLICATIONS:	111
Fish and Wildlife Service Publications	111
Miscellaneous Publications	114

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